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# THE POSSIBILITY OF CULTIVATING MAIZE IN REGIONS WITH LOW TEMPERATURES

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A survey of the influence of temperature on the development of maize and on the choice of varieties will give different results according to whether it includes maize for grain production or is restricted to maize for silage. In this review stress will be laid on the production of maize for silage north of those areas in which it is usually cultivated for seed production. The basis of this discussion will be the well-known climatic requirements of maize when grown for grain production.

## CLIMATIC REQUIREMENTS OF MAIZE

A survey of the literature dealing with the climatic requirements of maize was given by Shaw (34). He indicated that the literature on this subject is chiefly restricted to descriptions of the climate in areas where maize is cultivated for seed production, and is concerned only to a lesser degree with the specific effect of more extreme climate on the development of the plant. As a result, it is difficult to obtain a detailed picture of all the ecological problems connected with the cultivation of maize, and this account will therefore be concerned primarily with recent Swedish publications.

Because of the large variation between varieties it is difficult to lay down any general climatic requirements for the maize crop as a whole. This was pointed out by Shaw, and, on the basis of data from Finch and Baker (18), Ward (39), Wallace and Bressman (38), Jenkins (22) and Klages (26), he concluded that practically no maize is cultivated where the average night temperature over the three summer months is less than 55°F. Furthermore, the most important production areas in the Corn Belt in America are characterized by a mean summer temperature of 70–80°F., a mean night temperature not below 58°F., and a frost-free growing season of 140–150 days. Sprague (37) stated that the areas producing maize in the world as a whole are limited by the 70–80°F. isotherm for July. He also gave an up-to-date survey of maize production in those parts of the world fulfilling these minimum temperature conditions. With a mean July temperature of 70°F. for effective seed production, the northern limit for maize cultivation in Europe will pass through southern France, Switzerland, Austria and Hungary. Since the Second World War, however, cultivation of maize for seed production in Europe has moved northwards as far as the Netherlands and the middle of Germany. This development has resulted from the co-operation, organized by FAO, FOA and OEEC, between American and European scientists, so that it has been possible to apply in Europe American experience and hybrid material (21, 24, 35). It has proved that, in spite of poor adaptation to the different climatic conditions prevailing in northern Europe, American hybrid material has usually surpassed local material in seed production (21, 30, 32). Problems arising in the use of maize for silage have also been studied and the cultivation of silage maize has been extended still farther towards the north. For instance, trials have been carried out as far north as southern Norway and Central Sweden. Experiments at Uppsala (59°49′N.) indicate that the northern limit for growing silage maize is reached at this place.

The problems encountered in the breeding and cultivation of maize in northern countries can be discussed on the basis of a comparison between the minimum temperatures quoted by Shaw and Sprague and the corresponding temperatures at the northern limit for cultivation of silage maize. As it has not been possible to obtain such a comparison from existing literature, the corresponding temperature data for Uppsala, which lies on this northern limit, have been calculated for the period 1936–55. Data for these calculations have been obtained from the *Bulletins mensuels* of the Meteorological Observatory of the University of Uppsala (29). For the mean summer temperature, the average temperature for each month during the period May–September has been calculated. For the average summer night-temperatures, the average minimum temperatures during June, July and August have been used. The results are given in Table 1.

TABLE 1

Minimum temperatures and length of frost-free period for maize-grain production according to Shaw (34) and Sprague (37) compared with corresponding data for Uppsala.

| | Data according to Shaw and Sprague | | Data for Uppsala, 1936-55 | | Difference between data from Uppsala and data by Shaw and Sprague | |
|---|---|---|---|---|---|---|
| | °F. | °C. | °F. | °C. | °F. | °C. |
| Mean summer temperature (May, June, July, Aug., Sept.) | 66 | 19 | 57 | 14 | −9 | −5 |
| Average summer night-temperature (June, July, Aug.) | 55 | 13 | 51 | 11 | −4 | −2 |
| Mean temperature (July) | 70–80 | 21–27 | 64 | 18 | −6 to −16 | −3 to −9 |
| | days | | days | | days | |
| Length of frost-free seasons | 140–150 | | 137 (17 May—1 Oct.) | | −3 to −13 | |

A further comparison may be made between the Uppsala data and the temperatures quoted by Wallace and Bressman (38) as characterizing an ideal maize season in the central parts of the Corn Belt of the USA (see Table 2).

TABLE 2

Mean temperatures characteristic of an ideal maize season in the central part of the Corn Belt of the USA, compared with corresponding temperatures at Uppsala.

| | Corn Belt, USA | | Uppsala | | Number of degrees lower in Uppsala than in the Corn Belt | |
|---|---|---|---|---|---|---|
| Mean temperature | °F. | °C. | °F. | °C. | °F. | °C. |
| May | 65 | 18 | 50 | 10 | 15 | 8 |
| June | 71 | 22 | 59 | 15 | 12 | 7 |
| July | 73 | 23 | 63 | 18 | 10 | 5 |
| August | 73 | 23 | 61 | 16 | 12 | 7 |

From the comparisons in Tables 1 and 2 it is clear that maize production in such extremely northern areas as the middle of Scandinavia is limited not so much by the length of the vegetative period as by low temperatures. This temperature deficit is particularly conspicuous at the beginning of the vegetative period.

## PROBLEMS ENCOUNTERED IN THE CULTIVATION OF MAIZE AT LOW TEMPERATURES

Both fundamental ecological problems and more practical problems of cultivation and breeding are met with in the northward extension of maize production. The ecological problems include studies of the climatic requirements of the different cultivated varieties, studies of the local climate in new areas of cultivation, and studies of the microclimate within the growing crop. The plant-breeding problems will include the production of new varieties and hybrids suited to the new cultivation areas which differ from established areas particularly in lower temperatures and longer days. The cultivation problems will be those of technique, e.g. time of harvest in relation to silage quality, yield and choice of variety.

The influence of temperature on the development of maize may, however, be examined not only in relation to mean and minimum temperatures but also by means of heat-unit sums. Becker *et al.* (9), Andrew *et al.* (6) and Bengtsson *et al.* (11) have published results of recent studies of this kind. As is well known, theoretical objections may be made to the use of the heat-unit sum as an expression for a temperature effect as pointed out, for instance, by Klages (26). Seeley (33) showed that, for one period of 27 years, the heat units required for the growth of maize from sprouting to flowering varied from 1232 to 1919. The corresponding data for the period from flowering to maturity ranged from 897 to 1607, a very great variation. This may, perhaps, be explained by the fact that the calculation of heat units is not so reliable near the optimal temperatures as at supra-optimal temperatures, since the relationship between rate of growth and temperature is not linear but curvilinear. As has been stated by Bengtsson *et al.* (11), the use of the heat-unit sum as an expression for a temperature effect is therefore more useful in the temperate areas than in the hotter cultivation areas. This will be discussed further when sowing problems are considered.

From a physiological point of view a better expression of the influence of temperature on the growth of maize seems to be found in the "physiological temperature index" (28), which is based on investigations of the growth of maize and takes into consideration the decreased growth when the optimal temperature is exceeded.

It must also be remembered that maize, being of tropical origin, is a short-day plant. Therefore flowering is delayed by the increased length of day in northerly areas (8, 20). Andrew *et al.* (6) and Becker (8) have postulated that variations in development obtained in sowing-date experiments in the Netherlands could well be due to changes in the light climate during spring.

When maize is cultivated at temperatures below the optimal, it is probable that local climatic and micro-climatic factors have a relatively greater importance on development than they have under optimal conditions. In Sweden, it is well known that maize grows better when it is protected from temperature extremes but such aspects have not yet been systematically studied. However, preliminary microclimate studies (1) have been initiated to obtain, firstly, a better measure of the temperatures which influence development and secondly, to see to what extent cultivation techniques can vary the microclimate within the crop.

## COLD TOLERANCE IN THE SPRING

The breeding of maize for cold tolerance in spring involves two problems, emergence in cold, wet soils and growth at low temperatures. The first of these problems is to a large extent concerned with disease resistance which, in turn, is often dependent on environmental factors influencing the quality of the maize seed ; such factors include mechanical damage to the kernels, uneven ripening and frost damage. Disease resistance in maize is also dependent on genetic characters, but it is probable that the inheritance of such characters, related to cold tolerance, is rather complicated, so that breeding for such resistance is difficult.

In the " cold tests," which are designed mainly for disease resistance, the ability of maize varieties to emerge from cold, wet soils is investigated. These tests are based on methods suitable for American conditions and may not therefore be applicable under European conditions. Furthermore there are no standardized methods for testing for cold tolerance in connection with disease resistance, as was pointed out both by Bunting and Dijkhuis in 1955 (14). Such methods would, however, be especially desirable not only as seed-testing methods but also as methods for testing breeding products for their genetic disease resistance and its relationship with cold tolerance. The breeding of hybrid maize for European conditions is becoming of increasing interest, so that studies of the genetic disease resistance of maize germinating in cold, wet soils must be intensified. For such studies, cold tests in the laboratory are very useful, but at least under northern conditions there is also a need for investigations into the effect of low temperatures *per se* on growth and development in the field. Studies of the effect of low temperatures on germination and development of maize under conditions where disease problems are not encountered also deserve attention and should often precede studies of disease resistance. In fact the latter studies should be complementary to the former.

In this connection it is of interest to recall Bunting's statement (14) that the ability of maize to grow at low temperatures should be studied in such a way that the germinating kernels are not exposed to any factors limiting growth other than low temperatures. In this way he delimited the area of investigation still more, and, further, suggested a survey of the minimum temperature requirements for germination of maize varieties or selections. The main facilities for this survey should be : (a) ovens capable of maintaining a temperature constant to within $\pm 1$°C. and (b) field- or pot-studies of the growth of various selections during the initial weeks after emergence. Bunting and Willey (15) pointed out that maize varieties suitable for growing in north-western Europe should not only *survive* low temperatures but should also be able to *grow* at low temperatures during the early part of the growing season.

Studies at the Institute of Plant Husbandry of the Royal Agricultural College in Uppsala (1) during the years 1955-8 showed clearly that low air temperatures especially at the soil surface have a determining influence on growth. While this influence was found in all varieties, varietal differences were evident. Observations in field stands of maize indicated that periods with low temperatures do not need to be long. In experiments with artificial freezing carried out with the help of a portable refrigerator, according to a technique developed by Johansson and Torssell (23), it was found that temperatures between $\pm$ 0° and —0·5°C. for 6 hours were sufficient to produce a visible effect on the plants. Temperatures between —2° and —3°C. for 6 hours brought about a definite decrease in yield as well as visible effects on the plants.

There is no doubt that growth and development of maize under northern conditions is to a very great extent dependent on its reaction to low temperatures during periods of varying length. Harper (21) pointed out that certain lines of maize are killed when they are exposed to + 7·2°C. while others can survive exposure to $\pm$0°C. This is of interest because it indicates, as do the investigations of Åberg (1), that studies of temperature variations at different levels in the crop are necessary when the low-temperature effect is being investigated. Åberg was able to show that there are great temperature variations within the crop and also that periods of low temperature during the night may have an influence not only during the early part, but also during the latter part, of the growing season.

The observations of Åberg bring up the question whether it is possible in northern regions to use

the heat-unit system for studies of the development of maize and for a classification of maize in regard to development, flowering, etc. In their investigation Becker *et al.* (9) used the heat-unit system, and counted the negative values as zero. It is, however, unlikely that the damaging effect of low temperatures on a sensitive plant like maize can be ignored in this manner ; it was mentioned above that in the investigations at Uppsala a 6-hr. period with temperatures between −2° and −3°C. had a greater effect on the development and yield of maize than a 6-hr. period with temperatures between ±0° and −0·5°C. Therefore it is clear that if heat units, or rather temperature-degree sums, are to be used for maize they must be calculated with the help of continuous temperature measurements, which should be either continuous registrations or at least hourly measurements. It should then be possible to learn more about the effects of periods with low temperatures which are undoubtedly of importance for the growth and breeding of maize in northern areas. Åberg (1), using figures from 1955, has shown how important it is to calculate temperature-degree sums from frequent observations, and has drawn attention to the damaging effect of low temperatures on a crop as sensitive as maize.

## CULTIVATION OF MAIZE FOR SILAGE AND THE CHOICE OF VARIETIES

As stated earlier, the problems of cultivation and plant breeding are different when grain, rather than green matter for silage, is required. In the first case the main problem is the breeding and testing of varieties that can ripen and produce high grain yields under the new climatic conditions. In the second case, the quality of the silage is also involved, since this is connected with the harvest time and choice of variety.

When cultivating silage maize in climates where seed production is possible, the questions of harvest time, silage quality, total yield, and choice of variety are relatively simple; the crop should be harvested when the leaves and the stem are still fully green and when the ears have reached the medium-dent stage. The dry-matter content of the total green weight should then be about 30%, and of the ears about 45%. At this stage of ripening the fibre content is at a minimum, since it depends amongst other things on the production of easily dissolvable carbohydrates in the ears. The statement by Allen *et al.* (4) that " kernels are the key to good corn silage " illustrates the importance attached in the USA to the development of ears in this context. In the maize-growing districts of North America it is possible, on the basis of this discussion, to suggest which early varieties should be grown in different areas (4). Thus, 80-to-85 days' maize is recommended for northern Wisconsin (e.g. W 240, W 255, W 275, W 275 A, W 283), and 110-to-120-days' maize (e.g. W 685, W 692, W 710 A) for the southern part of the same State.

The principle that kernels are the key to good maize silage can also be followed in Central Europe, for instance in Switzerland (30) and in the Netherlands (10). Here the breeding programme aims at combining the earliness and cold tolerance in spring of the flint dent hybrids with the lodging resistance and high yield of the pure dent hybrids. Harper (21) pointed out that the choice of the best material of dent maize for such crosses is important. Successful results with hybrid breeding in Europe have also been obtained in the Netherlands, e.g. Goudster, the Pioneer hybrids and the CIV hybrids.

In Germany, where there are greater differences in summer temperature than in the Netherlands, the production of silage varieties is more complicated. Schnell (32) stated that in Germany there are great differences in the yield of varieties of varying earliness. Estimating the relative value of early and late varieties is difficult since the proportion of ears is different in the various groups. Schnell pointed out that the variety chosen should reach at least the " milk-ripe " stage. Earlier harvesting gives too high a proportion of fibre. If maize varieties differing in climatic requirements and ease of cultivation can be harvested at the optimal stage of ripeness, the variety with the highest nutritive value should be chosen. Schnell stated that for this purpose the total yield must be converted into starch units.

When cultivating silage maize in areas farther north than Germany, e.g. Denmark, varieties should be grown which may be harvested at an average dry-matter content of 20–30 % as in southern cultivation areas. For this purpose the Dutch hybrids Goudster and CIV 2 or the American hybrids (maturing in 80–85 days, e.g. W 240) are chiefly recommended (7). Bagge and Hanssen pointed out, however, that the optimal development stage mentioned above cannot always be obtained in Denmark with these varieties, but that harvesting should be delayed as long as possible during the autumn, since the development of the ears determines the quality of the silage.

In the production of silage maize in areas still farther towards the north, for instance southern and central Sweden, the interaction of time-of-harvest, quality, yield and choice of variety is more complicated. A ripening stage of 20–30 % dry-matter content seems practically unobtainable in the varieties recommended for Denmark by Bagge and Hanssen, and a better silage quality should therefore be obtainable with maize varieties that ripen as early as possible — for instance, Eagle Hill or the 70-days' maize W 1600. However, Åkerberg and Torssell (3) present results indicating that W 1600 is not always superior to later varieties in dry-matter content. This statement was based on a comparison of W 1600 with 6 other American

and 11 European hybrids of different earliness. In their investigation the dry-matter content of the varieties examined varied between 19–20% in 1953 and between 16–17% in 1954. Similar results have been obtained by Gelin and Gustafsson (19) and it does not always seem to be possible to solve the problem of high dry-matter content by growing the extremely early varieties in these northern areas. While the yield of early varieties is poor, Larsson (27) has shown that the yield can be increased by 10–15%, if the row-distance is reduced from 45 cm. to 25 cm. with the same seed rate/unit area.

The inverse relationship between earliness and yield mentioned by Schnell (32) has generally proved to hold for maize cultivation in Sweden (2, 3, 5). However, Åkerberg and Torssell (3) among others, have shown that there are exceptions to this rule ; for instance the Dutch hybrid Prior and the Swiss triple hybrid H(WH × WJ) × ZO 12–1–12. These two hybrids are of almost the same earliness class as W 240, but in these investigations they have outyielded W 240 by 30–50%.

The results obtained by Åkerberg and Torssell (3) concerning choice of variety and quality will be submitted to a somewhat more detailed discussion than the other studies quoted. If the difference in dry-matter content between the various earliness types is slight, but in total yield is great, it is of special interest to analyse the total yield in the highest-yielding late varieties. Consequently, the situation can be examined from two points of view ; firstly, low-yielding varieties may have a dry-matter content that is so favourable as to outweigh the low-yielding capacity ; or, secondly, the high yield of high-yielding varieties may not be sufficient to compensate for an unfavourable dry-matter content. The changes in the composition of the dry-matter content during the autumn was accordingly investigated in 6 hybrids of varying earliness.

All the varieties studied showed the well-known increase, with maturity, of the carbohydrate in the dry-matter content. There were no great differences between early and late varieties in this respect. The fibre percentage decreased by 2–3% and in 5 of the 6 hybrids it fell below 25%, values which are found, for instance, in a clover/grass mixture with clover at the immediate pre-flowering stage and timothy coming into ear. The percentage of crude protein decreased by 3–5% but no clear distinction between early and late varieties could be shown. Thus it has been possible with these varieties of maize to produce a green material with a dry-matter content having about the same fibre percentage as good hay. There is no evidence from the analyses to suggest that in 1954 (see above) early varieties had a particularly favourable, and late varieties a particularly unfavourable, composition.

The yield of sugar, starch, fibre and crude protein per unit area in these varieties was calculated. In 4 of the 6 hybrids the total amount of fibre had not increased during the later stages of ripening. Similarly the amount of crude protein was constant or had increased only a little. These observations are interesting but further studies under various climatic conditions are required. It would then be important to determine whether some of the substances forming part of the fibre in maize are transformed into more easily dissolvable carbohydrates under certain ripening conditions. Such a transformation during ripening has been observed by Kivimäe (25) in timothy.

In order to explain these unexpected resemblances in chemical composition between early and late varieties the distribution of the fresh weight between leaves, ear and stalk was estimated in varieties of varying earliness. As was expected, these investigations showed that the ear fraction decreased and the stalk fraction increased as the fresh weight was higher and the variety later. This consequently meant that in the highest-yielding types the stalk was an important component of the fresh weight, so that the chemical composition of the stalk almost certainly influences the quality of the crop. To study this aspect, the amount of sugar, starch, fibre, crude protein, etc. was calculated in the leaves, ears and stalks of a low-yielding, ear-rich hybrid, W 85 × W 15, and of a medium-late hybrid of higher yield and of few ears, W 255. It was found that the leaves of the two hybrids were of relatively slight importance in the total yield ; in the early variety, the stalk fraction was somewhat higher than the ear, but in the late variety the greatest part of the dry-matter yield (60 %) did in fact come from the stalk.* The proportion of fibre in the stalk was almost the same in the two hybrids, and in the medium-late hybrid, W 255, it certainly reached 27 %, but at the same time up to 60 % of the dry matter in the stalk consisted of easily dissolvable carbohydrates. This suggests that it may be possible to combine a good composition in silage maize even with the late varieties with a strong stalk development without a particularly high development of the ears.

In order to obtain a satisfactory composition of the stalk, varieties with a high proportion of easily dissolvable carbohydrates in the stalk should be aimed at. Maize has long been discussed and tried as a sugar plant (13, 16, 20) and, while the extraction of sugar from the stalks has proved possible, it is not present in such a degree as to compete economically with sugar-cane or sugar-

* High stalk-percentage, however, is not always found ; Åberg and Larsson (2) and Bengtsson *et al.* (11) obtained lower stalk-percentages which may be explained by different conditions of cultivation. Åkerberg and Torssell used a sowing rate of *ca* 75 kg./ha., while the other authors used 100–125 kg./ha., thus obtaining closer stands.

beet (40). Singleton (36) describes an inbred variety with a high sucrose content in the stalk and suggests breeding towards sacchariferous hybrids, for instance for feeding purposes, and Blanco and Blanco (12) have obtained good results in breeding such hybrids.

While the works quoted here have been concerned with sugar extraction from the stalk at the stage when the kernels are ripe, Reen and Singleton (31) studied the changes in the proportion of sugar in the stalk during the ripening of a sacchariferous inbred. They found that the proportion of sugar reached a maximum about 20 days after pollination and that half the proportion of sugar had already been formed at the time of pollination.

From the results of Åkerberg and Torssell (3) it may be concluded that under conditions of cultivation prevailing at the northern limit of silage-maize production (e.g. Uppsala, about 60° N.), the development of ears is often relatively slight, even in early varieties. If a dry-matter content of only 16–17 % is obtained, the degree of earliness does not seem to have any decisive importance on quality. It might then be possible to choose a variety with a high total yield of dry matter, i.e. a medium-late or late type, with strong stalk development. The development of such a variety corresponds with the conclusions of Andersson and Lööf (5) as far as maize for green fodder is concerned and varieties of this type appear to be grown in northern areas of Russia (17). Moreover, if these late and high-yielding types can be bred towards a high proportion of easily dissolvable carbohydrates in the stalk, considerable improvement in quality would seem to be obtainable.

The possibility of growing maize to the north of the normal maize regions by choosing late-ripening, high-yielding varieties with a high percentage of stalk should be considered as a preliminary suggestion requiring confirmation by further experimentation. The other possibility, the growing of medium-early to medium-late varieties (e.g. W 240, KF, Goudster, CIV 2 or W 335), is more in agreement with the principle of harvesting this crop as late as possible, when the number of ears is highest. In this case the total yield will increase as the harvest is delayed but the possibility of night frosts in September will determine the time of harvest (2). As reported by Bengtsson *et al.* (11) and Gelin and Gustafsson (19), the yield of crude protein will, however, decrease as harvest is delayed. Bengtsson *et al.* have compared maize for silage with other similar plants of current interest e.g. yellow sweet lupin and marrow-stem kale. They found that maize yielded less crude protein than the other crops examined, and emphasized that every effort should be made to increase the crude-protein content of maize. As the yield of crude protein will increase with the number of leaves, Bengtsson *et al.* pointed out that —at least on light soils—varieties with a high percentage of leaves should be suitable, and that, bearing in mind the yield of crude protein and the danger of frost, the time of harvest must not be too late. Harvesting at full flowering was recommended.

The choice of variety for the region to the north of the normal maize region depends on the method of growing, time of harvesting, total yield and chemical composition, and the position may be summed up as follows.

| Type of variety | Harvesting time |
|---|---|
| 1. Early (Eagle Hill, W 1600) | Ears in medium-dent stage. (Rows 25 cm. apart) |
| 2. Medium-late, high percentage of stalk with high content of sucrose. | After flowering stage. |
| 3. Late, high percentage of leaves. | Full flowering stage. |
| 4. Medium-early to medium-late. | Late, harvest determined by danger from frost. |

The fourth possibility is in better agreement with experience in the normal maize-growing regions; the third possibility becomes of interest when special attention is paid to the protein percentage in the maize fodder. The first and second possibilities appear to have much to commend them but require confirmation by further experimentation.

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# FIELD CROPS

## CEREALS

### WHEAT

*See also Abs. 1165, 1274, 1277, 1278, 1279, 1283, 1286, 1287, 1288, 1467, 1470, 1483, 1492, 1552, 1564, 1585, 1586, 1613, 1642.*

1090 Sarić, M. Influenza della diversa grandezza delle cariossidi sulla morfogenesi delle piante dei cereali e sulla loro produzione. [**Influence of seed size on morphogenesis and yield of cereal plants.**] *Sementi elette* 1959, **5**, No. 1, 44–53, bibl. 21, illus., English and German summaries. [Ist. Sper. Agr., Novi Sad, Yugoslavia]

In the investigation described carried out at Zemun Polje, in 1954–7, with the wheat variety Bankut 1205, barley, oats and rye, seed lots of 4–5 different 1000-seed weights were sown in plots at 2–3 dates in Oct.-Dec. Results showed that large seeds produced plants of greater development, and gave higher yields, than did small seeds, and that yields decreased with later sowing dates. As to yield, a greater number of seeds per sq. m. did not compensate for the small size of the seed ; e.g., the highest yield of wheat, 5080 kg./ha., was obtained from sowing seeds (1000-seed weight = 55 g.) at 326 seeds per sq. m., compared with 4464 kg./ha. from sowing the smallest seed (1000-seed weight = 16 g.) at 1105 seeds per sq. m.—E.B.O.

1091† Aldrich, D. T. A. **The effect of grazing management on the response of winter wheat to spring defoliation.** *Emp. J. exp. Agric.* 1959, **27**, No. 105, 10–16, bibl. 3. [Wye Coll., Univ. London]

In a small-plot clipping trial on a commercial crop of Cappelle Desprez wheat, the cumulative effect of defoliation on 29 March, 5 and 12 April, 1954, was compared with that of defoliation on one or two of these dates. Throughout April and May, estimated leaf production was less on the cut plots than on the controls, and much less on the plots cut 2 or 3 times. Clipping on all 3 dates, or on 12 April only, significantly reduced straw length. Only the control and the plot cut on 29 March showed lodging in June. Straw yields and the number of ears per yard of row were significantly reduced by clipping. There was no interaction between cutting dates. Single cuts taken on 5 or 12 April, or 2 successive cuts (29 March + 5 April), significantly increased grain yield. Three successive cuts (29 March, 5 and 12 April) reduced grain yield. 1000-grain weight showed similar trends. In a field-scale experiment in 1956, the effects of continuous and fold grazing by sheep were compared, using Banco wheat. The grazing treatments had no appreciable effect on yield or lodging, possibly because of the cold, late spring in 1956 and the lateness of the variety Banco, and no definite conclusions could be drawn.—A.M.H.

1092† González, M. H. and others. Pastoreo invernal de trigo en Chihuahua. [**Winter grazing of wheat in Chihuahua (Mexico).**] *Agricultura téc., Méx.* 1958, No. 6, 14 and 41–3, illus.

This paper describes 2 experiments by stock farmers on growing wheat for winter grazing in Chihuahua (a region liable to drought) with a view to extending the grazing season. One experiment was carried out at a high altitude at Santa Clara Namiquipa, which has a temperate-cold climate, an annual rainfall of 400–500 mm., most of which falls during July-Oct., and natural pastures consisting mainly of *Bouteloua gracilis*. The second experiment was carried out at Villa Aldama, which has a warmer climate and a farming system which is more intensive than at Santa Clara ; here the annual rainfall is 200 mm., but irrigation water is available. It is concluded that winter grazing of wheat, both with or without irrigation, has many advantages (described) which would benefit the economy of the region.—E.B.O.

1093 Waring, S. A. and others. **Fertility investigations on the black earth wheatlands of the Darling Downs, Queensland. 2. Moisture and evapotranspiration in relation to the wheat crop.** *Aust. J. agric. Res.* 1958, **9**, No. 6, 717–29, bibl. 13. [Dep. Agric., Univ. Qd, Brisbane]

The effects on wheat yields of available soil moisture at sowing, rainfall during the growing period, and evapotranspiration, were examined for 1951–4. The relationship between free-water-surface evaporation, available soil moisture and evapotranspiration was examined for 1951 and '52. Wheat yields were correlated with available soil moisture at sowing for the 4 years combined, the 2 drier years (1951 and '53) combined and the 2 wetter years (1952 and '54) combined. The relationship for the 4 years combined was sufficiently strong to suggest that available moisture at sowing could be used to predict yields. Yield was correlated with evapotranspiration for the dry year 1953 only. The ratio of yield to evapotranspiration was lower for the years with high rainfall during the growing period, the mean values for the

wet and dry years being 2·1 and 3·5 bu./in., respectively. Growing-period rainfall was correlated with yield for the month of August only, for the 2 dry years of 1951 and '53 combined. Evapotranspiration was correlated with free water-surface evaporation. Available soil moisture was correlated with evapotranspiration when data from the beginning and end of the season in 1953 were used, but was not correlated when monthly data were used. The method of calculating monthly available soil moisture is shown to be important in this correlation. A method for calculating available soil moisture over a monthly period, based on a mean daily figure for the month, is described. F. s.—A.M.H.

1094 Grammatikati, O. G. **[Water-storage irrigation for winter wheat in the steppe zone.]** [Russian] [Contained in] Biological bases of irrigation farming. 1957, pp. 105–16, bibl. 6, illus., Moscow. [Received Aug., 1958] All-Union Sci. Res. Inst. Hydrotech.]

There is information on the use of water-storage irrigation (watering applied to an area before the crop is sown), the effect of irrigation on wheat roots and on changes in osmotic pressure and water content in the leaves, with special reference to harvests obtained in the Rostov Province.—M.H.

1095 Johnson, W. H. **Machine and method efficiency in combining wheat.** *Agric. Engng, St. Joseph, Mich.* 1959, **40**, No. 1, 16–20, 29, bibl. 3. [Ohio Agric. Exp. Sta., Wooster]

Soft red winter wheat was combine-harvested at various dates and at moisture contents of 12–28%. The overall rate of drying of the grain during maturation in the field was 2·5% per day, under Ohio conditions ; drying from 20 to 14% moisture content normally took 4 days. When the crop stood in the field after maturation : test weight decreased at about 0·23 lb./bu./day ; germination was only slightly reduced ; loss of dry matter by leaching and oxidation was about 1·4% in 20 days ; there was no effect on milling and baking quality as long as the grain was handled with care during and after harvest ; the loss of grain from shattering and related causes was approximately 12 lb./ac./day. It is recommended that combining should be limited to grain of 20% moisture content or less, in order to maintain high test weight, germination and keeping quality. The efficiency of combine-harvesters is discussed in relation to grain-moisture content. F. s.—A.M.H.

1096 National Institute of Agricultural Botany. **Varieties of winter wheats.** *Fmr's Leafl. 8 N.I.A.B.* 1959, pp. 4.

Cappelle Desprez, Minister, Hybrid 46 and Banco are recommended for general use and N. 59 especially for use in the north of England. Newly recommended varieties are Flamingo, Dominator and Milfast. Bersee and Squarehead's Master are becoming outclassed.—A.M.H.

1097 National Institute of Agricultural Botany. **Varieties of spring wheats.** *Fmr's Leafl. 9 N.I.A.B.* 1959, pp. 2.

Svenno and Atson are recommended for general use. Atle is recommended only when good resistance to sprouting is required. Newly recommended varieties are Jufy I, Koga II and Peko. Fylgia II is becoming outclassed.—A.M.H.

1098 Statens Forsøgsvirksomhed i Plantekultur. Sortsforsøg med vårhvede 1954–58. **[Varietal trials with spring wheat 1954-8.]** *Medd. 611 Stat. Forsøgsvirk. PlKult.* 1959, pp. 2.

The results are given of trials with 5 spring-wheat varieties at 4 locations in Denmark. In 12 trials during 1954–8, mean grain yields of Heine's Peko, Heine's Koga and Weibull's Kärn II were 41·4, 40·9 and 38·6 hkg./ha. respectively, with lodging indices of 1·7, 2·1 and 3·6, on a scale 1–10, in which 10 = completely lodged. In 8 trials during 1956–8, mean grain yields of Abed Mentor barley and Heine's Fasan spring wheat were 48·1 and 40·4 hkg./ha., with lodging indices of 5·2 and 2·2, respectively. Brief descriptions are given of the varieties tested.—P.J.B.

1099 Meppelink, E. K. Registratie van het bakwaardeniveau van de inlandse tarwe-oogst 1957. **[Register of baking quality in the Netherlands wheat harvest, 1957.]** *Tien-jarenplan voor Graanonderzoek 1957*, [n.d.], 36–49, bibl. 3, illus. [Inst. Graan, Meel en Brood T.N.O., Wageningen]

Data are given of the baking quality and composition of the grain of 10 varieties of winter- and spring-wheat grown in different districts of the Netherlands in 1957. Mean grain yields of winter and spring wheats in 1956 were 3795 and 3480 kg./ha. and in 1957, 4241 and 3768 kg./ha., respectively. Of winter wheats in 1957, Leda and Carstens VI had the best baking quality ; Carstens VI and Heine's VII were the most widely-grown varieties. The area under Heine's VII fell in 1957, partly as a result of its susceptibility to yellow rust, while that under Carstens VI increased. Almost all the spring wheat grown in 1957 consisted of the variety Peko, which was slightly inferior to Carstens VI and superior to Heine's VII in baking quality.—P.J.B.

1100 Pané, M. J. El trigo " Pané 247", de secano extremado, es una preciosa fuente de proteínas. **[The wheat variety Pané 247, grown under very dry conditions, is a valuable source of protein.]** *Agricultura, Madr.* 1958, **27**, No. 318, 560–2, illus.

Wheat crops in Spain have been affected by drought during the past 10 years. The variety Pané 2 is highly resistant to drought, and Pané 247 moderately so. In very dry years Pané 247 had a flint texture, a reduced starch content and an increased gluten content (37–40% on a wet basis). In La Segarra region, where 90% of the wheat grown is Pané 247, wheat yields in 1958 were the lowest of the century, but quality was excellent. —E.B.O.

1101 TRENTIN, A. Orientamenti sulla coltura granaria. Produttività e qualità del prodotto. [**Directives on wheat-growing. Productivity and quality of the product.**] *Agricoltura d. Venezie* 1958, **12,** No. 11–12, 611–18. [Ist. Genet. e Sper. Agr., Lonigo, Italy]

Tables show the order of productivity and the quality of the grain of the wheat varieties tested in northern, central and southern Italy. The main conclusions for northern Italy are : (a) for areas where S. Pastore is usually grown, the new varieties Produttore and Leonardo are suitable ; these have characteristics and requirements similar to S. Pastore, but yield more and their grain is of a higher quality ; (b) for high fertility soils where wheat is subject to lodging, Mara, Funotto, Leone and S.13 (all resistant to lodging) are suitable ; Funotto and Leone gave the highest yields ; Leone was first for quality and resistance to frost.—E.B.O.

1102 FAVERO, A. **Carme 23.** *Sementi elette* 1959, **5,** No. 1, 59, illus.

A description is given of the new wheat variety Carme 23, introduced into cultivation in Italy in 1955.—E.B.O.

1103 SEMENTI ELETTE. Novità granarie "Michahelles" 1958. [**New wheat varieties "Michahelles" 1958.**] *Sementi elette* 1958, **4,** No. 5, 51–2, illus.

A description is given of 2 new varieties of soft wheat, bred by Michahelles, both autumn types, early and hardy: Generoso fam. 7, which yielded 4600–5500 kg./ha. in large-scale cultivations, and Stirpe C2-6-1, which is resistant to lodging.—E.B.O.

1104 BONFIGLIOLI, O. Le razze italiane di grano in Jugoslavia. [**Italian wheat varieties in Yugoslavia.**] *Sementi elette* 1959, **5,** No. 1, 10–27, bibl. 1, illus., English and German summaries.

An account is given of trials with Italian wheat varieties in Yugoslavia in 1957–8. Observations are reported on their resistance to cold. The yields obtained (tabulated) showed that several of these varieties are well adapted to various environments in Yugoslavia, where about 300,000 ha. were sown with them in 1958–9. [See also *Fld Crop Abstr.* 11 : 907.]—E.B.O

1105 THORPE, H. C. and DIXON, G. E. **New cereal varieties, 1959.** *K.I.O. Fortnightly* 1959, No. 477, 1. [Pl. Breed. Sta., Njoro]

The characteristics of 7 newly released wheat varieties are summarized, and brief recommendations are made as to areas of Kenya for which they are suitable.—A.M.H.

1106 GLYNNE, Mary D. **Effect of potash on powdery mildew in wheat.** *Pl. Path.* 1959, **8,** No. 1, 15–16. [Rothamsted Exp. Sta., Harpenden, Herts.]

Powdery mildew (*Erysiphe graminis*) was most severe on plots which had received unbalanced manurial treatment with N + P, but no K. The extra N made available by a preceding year under fallow increased the disease and enhanced the effect of K in reducing it. The lower incidence of powdery mildew on plots receiving dung was attributed, at least in part, to the extra K.—A.M.H.

1107 YOSHII, H. and YAMAMOTO, S. **On the hot bath water treatment of wheat seed for the control of loose smut, *Ustilago tritici* Rostrup.** *Ann. phytopath. Soc. Japan* 1957, **22,** No. 4–5, 169–72, bibl. 4, illus.

Wheat seed infected with *U. tritici* was treated in a hot-water bath at an initial temperature of 46°C. and allowed to cool to 25°C. A 5-hr. cooling period was as effective as one of 10 hr. for killing the fungus. F. s.—D.B.

1108 PICHLER, F. Zur Frage der Flugbrandbekämpfung mittels Einquelling oder Benetzung des Saatgutes. [**Concerning the control of smut by soaking or moistening the seed.**] *Z. PflKrankh.* 1958, **65,** No. 8, 472–5, bibl. 2.

For complete control of *Ustilago tritici* on wheat grain, using the soaking or the moist anaerobic method, the duration of treatment (h) should be related to the temperature of treatment (t) by the equation : $t = k \cdot \log h + c$, where k and c are constants. The equation was based on Niemann's results [*Fld Crop Abstr.* 12 : 16.]—D.B.

1109 WEIBEL, D. E. **Studies on the control of loose smut of wheat.** *Pl. Dis. Reptr* 1958, **42,** No. 6, 737–43, bibl. 6. [U.S. Dep. Agric. Texas Substation No. 6, Denton]

When seed of the wheat variety Quanah was soaked in water at 70–75°F. for 4·5 days the incidence of loose smut [*Ustilago* sp.] was reduced from 17·2% (for untreated seed) to 0·6% in 1956, and from 4·6 to 0·2% in 1957. Soaking also reduced seed germination. Addition of NaOCl at a concentration of 100 ppm. Cl, or ceresan, resulted in equal smut control and improved germination. Seed soaked for 6 hr. in water before storage in an airtight container for 4·5 days at 70–75°F. showed

little reduction in germination, and smut incidence was reduced to 1·1% in 1956 and to zero in 1957. F. S.—R.B.

1110 Kanzler, F. Untersuchungen über die Verbreitung des Zwergbrandes (*Tilletia contraversa* Kühn) in Bayern und Bekämpfungsmassnahmen. [**A study of the distribution of dwarf bunt (*T. contraversa*) in Bavaria and some control measures.**] *Bayer. landw. Jahrb.* 1958, **35**, No. 4, 454–92, bibl. 61, illus. [Inst. Acker- u. PflBau der Techn. Hochsch. München-Weihenstephan, W. Germany]

A survey was made of the distribution of dwarf bunt on winter wheat in Bavaria. The occurrence of bunt was related to topography, climate and crop rotations. From the findings of the survey, measures for reducing or preventing outbreaks of the disease could be recommended. Wheat was damaged less severely in upland than in low-lying areas. Early sowing (before 1 Oct.) resulted in a more severe attack than normal sowing (1–20 Oct.), and the severity of the disease was least when sown after 20 Oct. Narrow drill-rows were better than wide ones, and commercial fertilizers were better than stable manure for discouraging growth of the fungal spores. The severity of the disease was greatest when wheat was grown after red clover, less after root crops and only moderate after cereals. To control dwarf bunt in heavily infested fields, a spell lasting several years, of grass alone or a clover/grass mixture containing a high proportion of grass, followed by root crops, is recommended. For preventing outbreaks of the disease, the following rotation is recommended : red clover/winter rye or winter barley/potatoes/sugar-beet/winter wheat/spring barley with clover. Some chemical control measures are mentioned. The most satisfactory is soil treatment, 2–3 weeks after sowing winter wheat, with fungicides containing pentachlornitrobenzene or hexachlorbenzene as dust or, preferably, as spray. The rate of application of the dust is 50–100 kg. active ingredient (according to substance used) per ha. and of the spray 10–30 kg. active ingredient per ha. in a spray volume of 400–600 l./ha. The ground must not be harrowed after treatment.—D.B.

1111 Bardner, R. **Seed dressings for the control of wheat bulb fly.** *Pl. Path.* 1958, **7**, No. 4, 125–9, bibl. 8. [Rothamsted Exp. Sta., Harpenden, Herts]

The results are given of trials carried out in 1955–7, in which 27 insecticides were tested as seed dressings against *Leptohylemyia coarctata*. None of the treatments gave complete protection, but dieldrin and heptachlor at 1% of the weight of the seed reduced the number of damaged stems by 50–70%. —A.M.H.

1112 Luginbill, P., Jr, and McNeal, F. H. **Influence of seeding density and row spacings on the resistance of spring wheats to the wheat stem sawfly.** *J. econ. Ent.* 1958, **51**, No. 6, 804–8, bibl. 5, illus. [Montana Agric. Exp. Sta., Bozeman]

Infestation and stem cutting by the wheat stem sawfly (*Cephus cinctus*) in Rescue and Thatcher wheat decreased as the sowing rate increased and the row spacing decreased. F. S.—R.B.

1113 Skoog, F. E. **Systemic insecticides as seed and granular treatments to prevent grasshopper damage to margins of winter wheat.** *J. econ. Ent.* 1959, **52**, No. 1, 37–41, bibl. 18, illus. [Ent. Res. Div., Agric. Res. Serv., U.S. Dep. Agric.]

Preliminary tests on Yogo winter wheat showed that seed treatment with thimet and Bayer 19639 considerably reduced emergence in the field and moderately reduced germination in the laboratory. In the field, plant stands were only slightly reduced by applying these insecticides in the furrow in granulated form.—R.B.

1114 Horber, E. and Wüst, E. Bekämpfung der Maikäferengerlinge (*Melolontha vulgaris* F.) mit der zapfwellengetriebenen Rotieregge. [**Control of cockchafer larvae with a rotary cultivator.**] *Mitt. schweiz. Landw.* 1958, **6**, No. 3, 33–43, bibl. 5, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon]

Rotary cultivation is particularly effective for controlling cockchafer larvae (*M. vulgaris*) in wheat stubble, when carried out after rain during August of the flight year. Such cultivations kill the larvae more rapidly and in greater numbers than do insecticides. Further, the quality of the crop is not impaired by insecticides.—D.B.

1115† Jepson, W. F. and Heard, A. J. [**The frit fly and allied stem-boring Diptera in winter wheat and host grasses.**] *Ann. appl. Biol.* 1959, **47**, No. 1, 114–30, bibl. 27. [Imp. Coll. Sci. Tech. Field Sta., Sunninghill, Berks (W.F.J.) and Grassl. Res. Inst., Hurley, Berks (A.J.H.)]

Sampling for stem-boring larvae was undertaken in 1954–6 on ley plots of *Lolium perenne*, *Dactylis glomerata*, *Festuca arundinacea*, *F. rubra*, *Agrostis tenuis* and *Poa pratensis* in randomized experiments at Hurley. The samples showed infestations by dipterous larvae, mainly species of *Oscinella*, *Meromyza* and *Opomyza*. The larvae showed preferences for specific grass hosts. More larvae were found where plots had been grazed throughout the season than where an early hay cut had preceded grazing. The total numbers of larvae varied between 0 and 688 per sq. yd. in November. The larval populations of the leys were reflected in the populations in winter wheat which

followed the ploughing-up of the leys. Populations of up to 65 larvae per sq. yd., mostly species of *Oscinella*, were found in the wheat in March. In 1956 a heavy larval infestation was associated with the death of wheat plants in considerable numbers. F. s.—M.H.

1116 Bethmann, W. Zur Feststellung der Keimfähigkeit von Getreidesaatgut mittels der Tetrazoliumsalz-Methode. [**Determination of the germination capacity of cereal seeds using tetrazolium salts.**] *Z. landw. Vers. UntersuchW.* 1957, **3**, No. 6, 557–70, bibl. 13, illus., Russian and English summaries. [Received Jan., 1959] [Inst. Landw. Versuchs- u. Untersuchungswesen Halle-Lauchstädt, E. Germany]

From year to year there was variable agreement in the germination-capacity figure of cereal grains when determined by the biochemical method, using 2,3,5-triphenyl tetrazolium sulphate, and the usual sand-culture method. The extent of the deviation depended on the degree of seed dormancy. Preliminary experiments with spring wheat indicated that, at the milk-ripe stage, low temperature increased germination capacity when using the sand-culture method but not when using the tetrazolium method. F. Ger. s.—D.B.

1117 Belderok, B. Verslag van het in 1957 verrichte onderzoek aangaande kiemrust en schot. [**Report on research in 1957 on seed dormancy and sprouting.**] *Tien-jarenplan voor Graanonderzoek 1957*, [n.d.], 50–61, bibl. 4, illus. [Inst. Graan, Meel en Brood T.N.O., Wageningen]

Trials were conducted in 1957 on 2 wheat varieties liable to sprout in the ear (Minister and Carsten's VI) and two varieties resistant to sprouting (Mado and Peko). Germination trials were made on grain collected twice weekly during the period 2 weeks before, to 12 weeks after, harvest. The resistant varieties not only had lower germination vigour at harvest time than those liable to sprout, but also imbibed more water in order to attain a given germination percentage. The disappearance of dormancy in grains after harvest was not caused by cracks produced by drying. Other studies were made on : the absorption of water by individual grains during the above-indicated collection period ; the behaviour of grains in which a small puncture was made above the embryo ; the adverse effects on baking quality caused by sprouting in 14 varieties harvested in 1956 ; and on the use of Lemmerzahl's dextrine method for determining the amount of sprouting damage in wheat. This method was considered both simple and reliable.—G.M.R.

1118 Krustyn', A. O. [**Productivity of winter-wheat plants with different tillering capacity.**] [Russian] *Vestn. sel'skohoz. Nauki* (*J. agric. Sci. USSR*) 1958, **3**, No. 12, 53–6, English and German summaries.

The significance of tillering in enhancing growth and development of the main stem has been subject to conflicting opinions. The author's study (field and laboratory observations) with the wheat/*Agropyron* hybrid No. 1, and the Kursas and Ostka varieties of winter wheat, grown on peat/carbonate soil of Latvian SSR, showed that plants with many branched tillers form more robust ears with a greater number of grains of higher absolute weight, than do plants with few tillers.—M.H.

1119 Fustec, Éliane and Mathon, C.-C. Lumière et développement. Influence de l'intensité des radiations de grande longueur d'onde sur la formation des épis chez les Graminées. (Note préliminaire). [**Light and development. Influence of the intensity of long-wave radiations on ear formation in the Gramineae. (Preliminary note).**] *Bull. Soc. bot. Fr.* 1958, **105**, No. 5–6, 219–23, bibl. in text, illus.

In the investigations described, plants of wheat (*Triticum turgidum* fa. *compositum*) and barley (*Hordeum trifurcatum hexastichum nigrum*) were grown under artificial light of 6200–7000 Å. ; other wheat and barley plants were grown under light of half this energy. The sources of light used emitted 14,600 lumens per sq.m. of illuminating surface where light of short wave-lengths was predominantly used and 12,500 lumens where long wave-lengths were predominantly used. Halving the light intensity inhibited the development of primordia in wheat, and, to a lesser extent, in barley, which are both long-day plants not requiring a low-temperature pre-treatment to accomplish their thermophase. It is possible that this phenomenon occurred when the plants had completed their gonadogenesis ; at this stage certain qualities of the light radiations are decisive. [See also Abs. 713.]—E.B.O.

1120 Velasco, E. E. Experiencias de vernalización de trigo. Primeros resultados. [**Vernalization trials with wheat. First results.**] *An. Edafol. Fisiol. veg.* 1958, **17**, No. 5, 457–72, bibl. 24, English summary. [Esta. Exp. Zaidín, Granada, Spain]

The seed of 3 wheat varieties, Valenciano (late), Mara (medium) and Trimesino de la Costa (early) were vernalized at 6°–10°C. for 27 days and then sown in plots on 29 March. The vernalization treatment was effective on Valenciano only, which developed in its normal manner in spite of the late sowing (it is usually sown in early Nov. and harvested in mid-June).—E.B.O.

1121 Single, W. V. **The mobility of manganese in the wheat plant. 1. Redistribution and foliar application.** *Ann. Bot., Lond.*

1958, **22**, No. 88, 479–88, bibl. 17. [Res. Inst. Pl. Physiol., Imp. Coll. Sci. Tech., London]

Mn supply from the medium was so arranged that early leaves received sufficient for normal function, but subsequent growth was severely restricted by deficiency of the element. Under these conditions little or no redistribution within the plant was observed, so that the early leaves retained most or all of their Mn and remained healthy. When Mn was applied externally to the second leaves of deficient plants a small but significant amount was translocated to the growing points. The effect was slightly enhanced by repeated wetting of the treated leaves, but the amount translocated was still small in relation to that applied, and to the requirement of the plants. Mn is not readily transported by the phloem under these conditions, but this does not wholly account for the ability of some leaves to retain critical levels when a state of deficiency exists at the growing points. Possible mechanisms for this effect are discussed. F. s.—M.H.

1122 Single, W. V. and Bird, I. F. **The mobility of manganese in the wheat plant. 2. Redistribution in relation to concentration and chemical state.** *Ann. Bot., Lond.* 1958, **22**, No. 88, 489–502, bibl. 4. [Res. Inst. Pl. Physiol., Imp. Coll. Sci. Tech., London]

Wheat plants were grown in solution culture at two levels of Mn supply until the second leaves were fully expanded. The supply of Mn was then curtailed and symptoms of deficiency appeared in subsequent growth. Although redistribution of Mn at rates dependent upon initial content occurred in both high- and low-Mn plants, first and second leaves always retained sufficient for normal function, and remained healthy. In a second experiment no redistribution from the second leaves was observed under similar conditions of supply and demand. When the second leaves were killed and placed in water, up to 80% of the Mn diffused out, but extraction of similar leaves with 80% methanol removed only 15–20% of Mn present. These results suggest that the lack of mobility shown by the element is not due to precipitation or complex formation within the tissue, although at high levels of Mn supply the solubility of manganese silicate might be exceeded, and some precipitation may occur. F. s.—M.H.

1123 Albareda, J. M. and others. Interacción Ca/K en la absorción de estos elementos por la planta de trigo. 2. Relaciones Ca/K utilizadas y estudio de los resultados obtenidos. [**Ca/K interaction in the absorption of these elements by the wheat plant. 2. Ca/K ratios tested and study of the results obtained.**] *An. Edafol. Fisiol. veg.* 1958, **17**, No. 6, 503–63, bibl. 14, illus., English summary.

A study was made of the development of wheat plants grown in nutritive solutions in which the concentration of Ca and K varied from 25 to 3200 ppm., while that of other elements was held constant. The amount of each element assimilated by the plants was determined. The range of Ca/K ratios within which the wheat plants developed normally was 1/16 to 32/1. [See also Abs. 570] —E.B.O.

1124 Pauli, A. W. and Laude, H. H. **Protein and carbohydrate relationships in winter wheat as influenced by mechanical injury.** *Agron. J.* 1959, **51**, No. 1, 55–7, bibl. 14. [Kansas Agric. Exp. Sta., Manhattan]

See *Fld Crop Abstr.* 11 : 477.

1125 Kökény, B. Ricerche sul metodo di valutazione della qualità del frumento secondo Zeleny. Confronto fra i metodi Pelshenke e Zeleny. [**Investigations on Zeleny's method for evaluating wheat quality. Comparisons of Pelshenke's and Zeleny's methods.**] *Sementi elette* 1959, **5**, No. 1, 28–42, bibl. 27, illus. [Ist. Agron., Univ. Bologna, Italy]

In a trial to evaluate the quality of grain of 26 Italian varieties of soft wheat, good correlation was found between data obtained by Pelshenke's method and those obtained by Zeleny's method. Zeleny's method, modified by the author, is, however, considered preferable because it is simpler and quicker than the other.—E.B.O.

1126 Primost, E. Der Einfluss steigender Stickstoffgaben auf den Ertragsaufbau von Winterweizen. [**The influence of increasing nitrogen applications on the " structure " of the yield of winter wheat.**] *Z. Acker- u. PflBau* 1958, **107**, No. 1, 99–120, bibl. 13, English summary. [Landw. Vers. Stat. Steyr, Österreichische Stickstoffwerke A.G., Linz, Austria]

For several varieties of winter wheat there are tabulated the reactions of the yield factors (density of ear-bearing stalks, number of grains per ear, and grain weight) to increasing quantities of N (40–200 kg.N/ha.), given as a single or as split applications, at different stages of crop growth, in voralpine and pannonic climatic regions, and on several soil types. Density of ear-bearing stalks and number of grains per ear were the most important yield factors, while grain weight was of minor importance. When the optimum level of N had been exceeded, density of stand increased excessively and yields fell as a result of fewer grains per ear and lower grain weight. The relationship between the yield components was typical of a variety only under constant environmental conditions. It was modified slightly by soil and climate and greatly by manuring.—D.B.

1127 Ballatore, G. P. Orientamenti sulla concimazione del frumento in Sicilia. [**Directives for manuring wheat in Sicily.**] *G. d. Sicilia* 1956, 11 Nov., pp. 6. [Received Jan., 1959]

As the Sicilian soils are deficient in P, superphosphate should be applied at 400–600 kg./ha. When wheat follows a legume crop, N should be top-dressed at 20–30 kg./ha. in the form of ammonium sulphate or ammonium nitrate (sodium nitrate and calcium nitrate are not recommended for warm, arid regions). Trials on clays have shown no advantage from K manuring.—E.B.O.

1128 Vogler, E. La fumure phosphatée et potassique des blés est indispensable. [**P and K manuring of wheat is indispensable.**] *Potasse* 1959, **33,** No. 261, 3–6, illus.

As a result of trials in different regions of France, in 1957–8, it is recommended that 80–150 kg. $K_2O$/ha. be applied to wheat either during autumn or spring, in addition to 80–150 kg. $P_2O_5$. In one series of trials, dressing with 100 kg. $K_2O$/ha., in either autumn or spring, raised the grain yield of wheat by 190–610 kg./ha.—E.B.O.

1129 Sulzer, J.-P. La fumure des blés durs. [**The manuring of durum wheat.**] *Potasse* 1959, **33,** No. 261, 21–2, illus.

The growing of durum wheat has been resumed in south France. As a result of trials in Gard and Hérault it is recommended that 2–3 dressings supplying a total of 55–60 units of N/ha. be applied to this crop (this amount can be reduced, depending on the residue left by the preceding crop), in addition to 100 units $P_2O_5$ and 150 units $K_2O$ which should be ploughed-in during soil cultivation.—E.B.O.

1130 Fernández, G. R. and Laird, R. J. **Yield and protein content of wheat in Central Mexico as affected by available soil moisture and nitrogen fertilization.** *Agron. J.* 1959, **51,** No. 1, 33–6, bibl. 21. [Oficina de Estudios Especiales, Sec. Agric. Ganad., Mexico]

A field study was made of the influence of soil-moisture conditions and N fertilization on the yield and protein content of wheat produced on a heavy clay soil with a high concentration of soluble salts in the 2- to 4-ft. horizon. The wheat was irrigated when the available soil moisture in the 2- to 12-in. horizon was 61, 49, 34 or 1%, and received 0, 45, 95 or 135 lb. N/ac. Application of 135 lb. N/ac. increased grain yield from 10·2 to 66·5 bu./ac. in the highest soil-moisture treatment and from 9·7 to 35·9 bu./ac. in the lowest. Straw yields were increased from 0·5 to 4·3 and from 0·4 to 1·5 tons/ac. in the wettest and driest treatments, respectively. At the highest N level, increases in soil-moisture content increased grain yields by 85% and straw yields by 187%. The protein content of the grain was decreased by the application of 45 lb. N/ac. and increased by larger amounts of N. The protein content was lowest in the wettest treatment and highest in the driest treatment. It was concluded that a minimum available moisture content of about 30% must be maintained in this soil for the production of maximum grain yields. F. S.—A.M.H.

1131 Lindgren, D. L. and others. **Studies on hydrogen phosphide as a fumigant.** *J. econ. Ent.* 1958, **51,** No. 6, 900–3, bibl. 1. [Citrus Exp. Sta., Riverside, California]

$H_3P$ afforded excellent insect control in stored wheat grain without affecting germination. —R.B.

1132 Strong, R. G. and Lindgren, D. L. **Effect of methyl bromide and hydrocyanic acid fumigation on the germination of wheat.** *J. econ. Ent.* 1959, **52,** No. 1, 51–60, bibl. 8. [Univ. California Citrus Exp. Sta., Riverside]

Grain of the wheat varieties Ramona 50 and Onas 54 containing 8, 10, 12 and 14% moisture was fumigated at 50, 70 and 90°F. with HCN for 72 hr. and with $CH_3Br$ for 2, 8, 24, 48 and 72 hr. HCN had no effect on percentage germination. Ramona 50 appeared to be somewhat less sensitive than Onas 54 to $CH_3Br$ injury. Increases in dosage, fumigation temperature, period of exposure and moisture content of seeds caused decreases in the percentage germination following fumigation. Progressive reductions in germinating capacity with repeated fumigation occurred only where the initial fumigation damaged the seed. Storage for 84 days after fumigation had no further effect on germination.—R.B.

1133 Haertlein, H. Evolución de la calidad comercial, molinera y panadera de los trigos argentinos frente a las exigencias del mercado interno e internacional. [**Evolution of the commercial, milling and baking quality of Argentinian wheats in relation to the requirements of the internal and international market.**] *Rev. argent. Agron.* 1958, **25,** No. 3, 115–33. [Lab. S.A. Molinos Fénix, Rosario, Argentina]

## OATS

*See also Abs. 1090, 1160, 1276, 1277, 1279, 1283, 1286, 1287, 1288, 1483, 1490, 1496, 1562, 1564, 1586, 1613.*

1134 Thompson, R. K. and Day, A. D. **Spring oats for winter forage in the Southwest.** *Agron. J.* 1959, **51,** No. 1, 9–12, bibl. 10. [Arizona Agric. Exp. Sta., Tucson]

Five experiments were conducted in 1955–8

to study forage production by irrigated spring oats and spring barley, grown during the winter months. Varieties used were : Markton, California Red, Palestine and Colorado White spring oats and Harlan, Vaughn and Arivat spring barley. Winter pasture forage-yields equivalent to 18 tons/ac. were obtained from spring oats. To obtain the most uniform and sustained vegetative growth, grazing from onset of the jointing stage throughout the winter pasture season is recommended. Oats produced more winter forage than barley. Spring oats produced yields of green chopped feed of up to 30 tons/ac. and hay yields of up to 8 tons/ac. Markton was the most suitable variety for winter pasture, green chopped feed and hay production. F. s.—A.M.H.

1135 National Institute of Agricultural Botany. **Varieties of oats.** *Fmr's Leafl. 13 N.I.A.B.* 1959, pp. 4.

Notes are given on the spring oat varieties Blenda, Sun II, Opus II, Maldwyn and Milford and the winter oat varieties Penrhyn, Powys, S147, Picton and S172. Of these, Opus II and Picton are becoming outclassed. Penrhyn is a new recommendation.—A.M.H.

1136 Kent, N. L. and others. **The yield and quality of oats in south-east Scotland trials, 1951-56.** *Scot. Agric.* 1958, **38,** No. 3, 126–32, bibl. 7. [Edinburgh and E. of Scotland Coll. Agric.]

The results are given of 37 trials with 26 oat varieties. Sun II yielded an average of 30·4 cwt. grain/ac. and was outyielded only by Minor, which gave 4% higher grain yields and 1% higher kernel yields. Varieties regarded as of satisfactory milling quality were : Milford, Blenda, Sisu, Rex, Lightning, Sun II, Marne, Eagle, Palu and Star. Less satisfactory in quality, but still regarded as adequate, were : Ayr Commando, Ayr Line Potato and Aa. 729. Data are given of kernel protein, kernel oil and kernel yields, straw length, days to ripen, % double grains, kernel content and 1000-kernel weight.—P.J.B.

1137 Bain, R. **Choice and use of oat varieties.** *Scot. Agric.* 1958, **38,** No. 3, 159–60, bibl. 1.

Advice is given on the cultivation of oats in Scotland and suggestions are made for the choice of varieties for particular conditions.—P.J.B.

1138 Statens Forsøgsvirksomhed i Plantekultur. Forsøg med havresorter 1955–58. [**Trials with oat varieties, 1955-8.**] *Medd. 609 Stat. Forsøgsvirk. PlKult.* 1959, pp. 4.

In 43 trials at 12 locations on mineral soils in Denmark during 1955–8, yields of Marne, Abed Max, Svalöf Stål A [Steel A] and Abed Palu averaged 40·6, 40·6, 39·7 and 39·4 hkg. grain/ha., respectively. Abed Max gave the highest straw yield, with 48·4 hkg., followed by Svalöf Stål A, with 46·6 hkg./ha. In 23 trials during 1957–8, yields of Vigor, Svalöf Vg 01534f (elite of Stål A), Pendek, Silber II and Pegase averaged 41·2, 39·9, 39·9, 38·6 and 37·2 hkg. grain/ha., respectively. Highest straw yields were given by Vigor and Svalöf Vg 01534f. Data are also given of yields in limited trials on organic soils and brief notes are given on the varieties tested.—P.J.B.

1139 Andersen, S. Havreålens betydning og bekæmpelse. [**The importance and control of the oat eelworm.**] *Ugeskr. Landm.* 1958, **103,** No. 42, 655–9, illus. [Roy. Vet. and Agric. Coll., Copenhagen]

A brief report is given of trials in which oats were grown in pots containing soil with amounts of eelworm eggs and larvae ranging from 1000 to 20,000 per kg. soil. Amounts of only 1000 eggs + larvae resulted in substantial reductions in the weight of straw + grain ; in 1958, this level of infestation resulted in yield reductions of *c.* 30%. The effect of these levels of infestation on yields in the field was not thought likely to be so serious. Control measures discussed include : heavy rolling of the soil, heavy N treatments or irrigation to assist the crop to grow away from attack, and the use of non-susceptible crops, including rye. Among oat varieties, Stål (Steel) and Ørn (Eagle) are more resistant than Rex and Minor. Among barley varieties, Drost, Alfa, Fero and Kran have shown resistance. The incidence of different strains of eelworm in Denmark and the resistance of Kron barley are discussed in some detail.—P.J.B.

1140 Empson, D. W. **Field trials of DDT against frit fly on spring oats.** *Pl. Path.* 1958, **7,** No. 3, 77–80, bibl. 3. [N.A.A.S. W. Midland Reg., Wolverhampton]

Results of experiments for the control of frit fly [*Oscinella frit*] on oats by means of DDT are tabulated. Two sprayings in May, a fortnight apart, each of 3 pints 20% miscible DDT in 30–40 gal. water per ac., resulted in a 60% reduction in the number of shoots attacked and a mean increase in grain yield of 2·4 cwt./ac. above the control. Treatment was profitable when there was a heavy infestation.—D.B.

1141 Ministry of Agriculture, Fisheries and Food, England and Wales. **Frit fly.** *Adv. Leafl. 110 Minist. Agric. Fish., Fd, England and Wales* 1959, pp. 5.

Infestation of spring oats by frit fly (*Oscinella frit*) may be avoided by early sowing, so that the plants reach the more resistant 4-leaf stage by mid-May. If winter cereals are sown after a ryegrass ley, the land should be ploughed early, preferably before the normal harvest time for cereals. In oat

crops sown after 1 April, attack by the 1st frit fly generation was reduced by spraying with 3 pt. 20% DDT emulsion/ac. in the 1st and 3rd weeks of May, or by one application of dieldrin (2·6 pt. 15% emulsion/ac.) at the 3-leaf stage. This rate of dieldrin, or 2 pt. 20% parathion emulsion/ac., also gave useful control when sprayed not more than 2 weeks after the appearance of visible damage.—A.M.H.

1142† Bromfield, S. M. **The solution of $\gamma$-$MnO_2$ by substances released from soil and from the roots of oats and vetch in relation to manganese availability.** *Plant and Soil* 1958, **10**, No. 2, 147–60, bibl. 21. [Div. of Pl. Industr., C.S.I.R.O., Canberra]

1143 Murphy, H. C. and others. **Lodging resistance studies in oats. 1. Comparing methods of testing and sources for straw strength.** *Agron. J.* 1958, **50**, No. 10, 609–11, bibl. 12. [Iowa Agric. Exp. Sta., Ames]

Two methods for evaluating lodging resistance, (a) the snap test (in which stems are pulled into a ' reclining position ' and allowed to spring back ; the force required to displace them and the rate of springing back being recorded on a scale of 1–10) and (b) the lodging-resistance factor method [see *Fld Crop Abstr.* 8 : 406], were compared using 5471 oat strains in 1955, and 100 strains in 1956. Measurements by methods (a) and (b) were highly correlated with natural lodging, but the snap test showed closer correlation, exhibited less seasonal interaction and was more rapid, though its use required a larger plant population. A lodging-resistance index is proposed and explained. On the basis of this index, the varieties most resistant to lodging were C.I. 7318, C.I. 5154, C.I. 5155 and C.I. 7317 — all Scottish strains. C.I. 7317 is a Craig's Afterlea selection.—R.B.

1144 Verma, R. D. and others. **Studies on the uptake of phosphorus from $^{32}$P-labelled superphosphate by crops. 1. Oats.** *J. Sci. Fd Agric.* 1959, **10**, No. 2, 100–7, bibl. 24. [Indian Agric. Res. Inst., New Delhi, Biophysics Dep., Univ. Edinburgh and Edinb. and E. Scot. Coll. Agric., Edinburgh]

In a pot experiment using soils high and low in available P, Blenda oats received $^{32}$P-labelled superphosphate at 0, 40, 80 or 160 lb. $P_2O_5$/ac., combined with ammonium sulphate at 0, 40 or 80 lb. N/ac. The plants were sampled at 31, 54 and 94 days from sowing. In both soils, N dressings were relatively ineffective at the 1st sampling, but showed marked effects later in the season. The 80-lb. level gave significantly higher shoot yields than the 40-lb. on both soils at the 2nd sampling and on the high-P soil at the 3rd. After the 1st sampling there was no yield response to P, except on the low-P soil at maturity. The $P_2O_5$ content of oat shoots grown in the high-P soil was 25–100% greater than that of plants from the low-P soil, under all treatments. Application of N, or the 40-lb. dressing of $P_2O_5$, decreased % $P_2O_5$ in the dry matter. Higher rates of $P_2O_5$ increased the % $P_2O_5$ in the dry matter. The % $P_2O_5$ content of the shoot decreased as the season progressed, particularly during grain formation. Plants in the low-P soil derived more of their total P uptake from fertilizer than those in the high-P soil. In the low-P soil, the % of the total P uptake which was derived from fertilizer fell steadily throughout the season; in the high-P soil, this % fell sharply between the 1st and 2nd dates of observation and rose again at maturity. The high rates of P depressed grain yields, especially on the low-P soil. Uptake of soil P from the P-deficient soil was depressed so much by applying superphosphate that the total uptake was less at the 3rd sampling than that of plants receiving no P. In the high-P soil, the lower rates of $P_2O_5$ depressed total P uptake to a level below that in the controls, but the highest rate stimulated P uptake.—A.M.H.

1145 Arnold, R. E. and others. **The effect of moisture content of the grain and the drum setting of the combine-harvester on the quality of oats.** *J. agric. Engng Res.* 1958, **3**, No. 4, 336–45, bibl. 2. [Nat. Inst. Agric. Engng, Silsoe, Beds]

S225 oats were combine-harvested, using a range of cylinder speeds and concave clearances at 5 different moisture levels (< 16%, 16–19%, 19–22%, 22–25% and 25–28%) and were then stored in semi-insulated containers. Throughout the storage period of 6 months, regular germination tests and mould assessments were carried out to ascertain the degree of damage suffered by the grain at threshing and the influence of damage on keeping quality. Grain harvested at 19–22% moisture content suffered least damage; at the other levels used, germination of the grain was lower and it showed a greater tendency to develop mould during the germination test. Increases in cylinder speed also reduced germination and increased the tendency to mould, the effect increasing as the moisture content of the grain at harvesting departed from the optimum of 21%. Close concave clearances slightly reduced germination at harvest moisture contents of 16–25%, but at moisture contents above and below this level, the effect was not consistent. F.S.—A.M.H.

1146 Waller. Från Segerhavre till Solhavre II – några resultat från en femtioårig vithavreförädling. **From Victory oats to Sun II oats – some results of fifty years of breeding of white oats.** *Sverig. Utsädesfören. Tidskr.* 1958, **48**, No. 6, 297–305, illus., English summary.

A review is given of the work of the Swedish Seed Association in the field of oat breeding over the last 50 years.—P.J.B.

1147 Leask, D. M. R. **The 1957 oat crop [in Scotland].** *Econ. Rep. 54 Edinb. E. Scot. Coll. Agric.* 1958, pp. 12.

The investigations reported in *Fld Crop Abstr.* 12 : 48 were continued for a second year. Costs per ac. did not vary greatly from 1956 to 1957, but costs per cwt. varied inversely with yields. The net cost per cwt. of grain was 6s. 8d. higher on upland than on lowland farms.—A.M.H.

## RYE

*See also Abs. 1090, 1286, 1586.*

1148 Goffart, H. Anbauversuche mit " Heertvelder " - Roggen zur Bekämpfung der Stockkrankheit des Roggens. [**Cultivation trials with Heertvelder rye for the control of eelworm disease.**] *Z. PflKrankh.* 1958, **65,** No. 11, 657–60, bibl. 5, English summary. [Biol. Bundesanst. für Land- u. Forstwirtsch. Münster i. W., W. Germany]

In soils infested with stem eelworm (*Ditylenchus dipsaci*), Heertvelder rye (Dutch) gave considerably higher grain yields (about 50% in 1954) than Petkuser rye, but in healthy soils, grain yields were 17–20% lower than from Petkuser.—D.B.

1149 Primost, E. Der Einfluss steigender Stickstoffgaben auf den Ertragsaufbau von Roggen. [**The influence of increasing applications of N on the yield factors in rye.**] *Z. Acker- u. PflBau* 1958, **107,** No. 2, 180–94, bibl. 2, English summary. [Landw. VersStat. Steyr, Österreichische Stickstoffwerke A.G., Linz, Austria]

The 3 factors which contribute to grain yield of rye are : density of stand, number of grains per ear, and 1000-grain weight. In some varieties, increased N manuring increased density of stand, in others it increased the number of grains per ear. Weather also modified the relative importance of the yield factors. The paper closes with a discussion on the significance of stand density as a factor in yield formation. F.Ger. s.—D.B.

## BARLEY

*See also Abs. 1090, 1098, 1119, 1134, 1139, 1276, 1277, 1278, 1279, 1283, 1286, 1287, 1288, 1483, 1490, 1492, 1548, 1564, 1582, 1586, 1613, 1630.*

1150 Anand, S. C. **The growth and yield of barley in relation to time of sowing.** *Indian J. Agric.* 1958, **2,** No. 4, 225–31, bibl. 3. [Coll. Agric., Banaras Hindu Univ.]

Using 3 varieties of barley, the sowing dates were 27 Oct., 6 and 16 Nov. As the sowing date was brought forward, percentage germination and density of stand at harvest decreased significantly ; but tiller production, total dry weight per plant, yield of grain per plant and per acre, and 1000-grain weight increased. (The usual sowing date is late October to mid-November.)—D.B.

1151 National Institute of Agricultural Botany. **Varieties of barleys.** *Fmr's Leafl. 10 N.I.A.B.* 1959, pp. 4.

Ten spring barley varieties are listed, with notes on each. Rika and Proctor are recommended for general use and Freja, Provost, Maythorpe and Earl for special use. Herta, Carlsberg II, Spratt-Archer and Plumage-Archer are becoming outclassed. The winter barley variety Pioneer is also described.—A.M.H.

1152 Buchli, M. Anbauversuche mit Wintergerstensorten 1956–1958. [**Cultivation trials with winter-barley varieties 1956–8.**] *Mitt. schweiz. Landw.* 1958, **6,** No. 11, 171–5, illus. [Eidg. Landw. Versuchsanst. Zürich-Oerlikon]

Several new foreign varieties of winter barley (chiefly German) were tested for 3 years against Riniker, the only winter barley variety of Swiss origin remaining in cultivation in Switzerland. Resistance to lodging, earliness, grain- and straw-yields are tabulated. The grain yields of Hauters Wintergerste, Dea and Firlbeck I were significantly higher than yields of all other varieties. Riniker gave the lowest grain yield. Hauters Wintergerste, a varietal hybrid bred in the Palatinate, combined many desirable characters. Its grain yields were consistently high in each year of trial. It overwintered well, was very resistant to lodging and matured early, though not so early as Riniker. Hauters Wintergerste gave a rather low straw-yield. It requires seed treatment against *Helminthosporium gramineum* and a well manured soil. This variety has been admitted provisionally to the list of the Swiss Seed-Breeding Association. Continued cultivation of Riniker is justified because of its extreme earliness ; it is ready for harvesting between 20 and 30 June.—D.B.

1153 Rico, M. E. El desarrollo de la variedad de cebada " Funza ". [**The barley variety Funza.**] *Agric. trop., Bogotá* 1958, **14,** No. 10, 633–5, illus.

Information is given on the variety Funza, which in the Sabana de Bogotá, Colombia, provides 99% of the malting barley requirement. By replacing the old barley varieties with Funza and by improving cultural methods, the yield per unit area has been increased by 50% and the growing period reduced by 15%.—E.B.O.

1154 Chinn, S. H. F. and Russell, R. C. **The control of soaking injury of barley seed.** *Phytopathology* 1958, **48**, No. 10, 553–6, bibl. 11. [Canada Dep. Agric. Res. Lab., Saskatoon, Saskatchewan]

Barley seed, soaked for 65 hr. in water at 24°C. to control loose smut [*Ustilago nuda*], showed impaired germination. The addition of various chemicals to the water reduced the amount of seed damage ; $HgCl_2$ at 0·02% was the best, followed by 0·1% $AgNO_3$, 1% sodium citrate, 1% ammonium phosphate, and 1 or 2% NaCl.—R.B.

1155 Analysis Committee. Institute of Brewing. **Recommended methods for determining the germinative capacity of barley.** *J. Inst. Brew.* 1958, **64**, No. 6, 468–9.

Three methods are recommended : (a) staining with triphenyltetrazolium ; (b) staining with iodonitrotetrazolium ; (c) steeping in $H_2O_2$ followed by peeling where necessary. Method (c) is described. [See *Fld Crop Abstr.* 11 : 966.]—R.B.

1156 Bishop, L. R. **Barley dormancy as a varietal characteristic.** *J. Inst. Brew.* 1958, **64**, No. 6, 484–8. [Stag Brewery, Pimlico, London]

Results of the 1953–6 seed-dormancy tests sponsored by the European Brewery Convention Barley Committee are summarized. In 1951–3 the percentage dormancy was low, especially in central Europe, while in 1954–6, it was relatively high for most varieties. Results for 1954–6 support the view that dormancy in barley is a varietal characteristic. At each testing centre in each of the 3 years 1954–6, Busser exhibited more, and Domen less, dormancy than did Kenia barley. In Switzerland and Italy in 1955 pre-germination occurred in Domen barley. It is considered possible, and advisable, to select new barley varieties on the basis of optimum degree of dormancy for the climate of the region where they are to be grown.—R.B.

1157 Buttrose, M. S. and May, L. H. **Physiology of cereal grain. 1. The source of carbon for the developing barley kernel.** *Aust. J. biol. Sci.* 1959, **12**, No. 1, 40–52, bibl. 13, illus. [Waite Agric. Res. Inst., Adelaide]

Organic substrate for development of the barley kernel is derived mainly from current assimilation of $CO_2$. This paper describes a study of the relative importance of the potential sources of this substrate, using ear shading, $^{14}C$ as tracer and kernel-competition techniques. Shading the ears of awnless, single-awned and triple-awned varieties of barley led to significant reductions in yield of 9, 23 and 18%, respectively, although the differences between these values were not significant. When $^{14}C$ was supplied either to attached ears as $^{14}Co_2$, or to detached ears through the peduncle as $^{14}C$-sucrose, radioactivity was incorporated in the kernel during the period from anthesis to maturity, and its subsequent distribution in the kernel was similar for each source of supply. Translocation following feeding of $^{14}CO_2$ was also examined and it was concluded that little movement occurred except at an early stage of ear development. Competition between kernels was not evident, but was induced when the carbohydrate supply was artificially depleted. A proposed scheme to illustrate the contribution of different parts of the plant to kernel development is given and a new method for calculating the maximum contribution of photosynthesis within the ear to kernel yield is presented. F. s.—A.M.H.

1158 Jonker, J. J. De ontwikkeling van het wortelstelsel van zomergerst. [**The development of the root system in spring barley.**] *Jaarb. NaCoBrouw* 1959, **23**, 33–8, English summary.

The number of roots formed during germination varies between 5 and 8 depending on the barley variety, size of grain and soil conditions. These roots rapidly form lateral branches. Adventitious roots begin to develop only after tillering has begun, in contrast with oats. Barley is therefore more dependent than oats on favourable soil conditions in the plough layer beneath the seed-bed, where the primary root system proliferates. The roots of barley cease to branch on reaching the subsoil, but may reach a depth of 50 cm. by the time tillering commences. Under conditions which inhibit the rate of primary-root proliferation the shoot system grows more slowly. The first adventitious roots form beneath the soil surface, but later they may develop on the lowest nodes above ground. In contrast with the primary root system, adventitious roots tend to grow sideways and branch to form a network close to the soil surface. Root development almost ceases at flowering. As the grain ripens, all roots except those penetrating the plough layer die.—R.B.

1159 Jacobson, L. and others. **Non-metabolic uptake of ions by barley roots.** *Pl. Physiol.* 1958, **33**, No. 4, 278–82, bibl. 21. [Coll. Agric., Univ. California, Berkeley]

1160 Dobben, W. H. van. Het toetsen van zomergerstrassen op gevoeligheid voor lage pH-waarden in een potproef. **A testing method to determine the susceptibility of spring barley varieties to soil acidity.** *Jaarb. Inst. Biol. Scheik. Onderz. LandbGew., Wageningen 1958*, 1958, 29–34, bibl. 2, illus., English summary.

Ten spring barley varieties were grown, with or without oats (var. Libertas), in pots each holding 6 kg. of soil to which 100 ml. of 1% $H_2SO_4$ had been added. Ten barley plants, or 5 barley and 5

oat plants, were grown in each pot. The soil-water in the pots was at pH 3·5. Great differences in barley growth, as measured by the number of grains produced per plant, were apparent between pure stands of barley and mixed stands of barley and oats, owing to differences in the amount of competition. There was an inverse relationship between the number of grains produced per barley plant and the number produced per oat plant in the same stand. The coefficient of competition (the ratio between the number of grains produced per barley plant and the number of oat spikelets produced, where both are grown together, divided by the ratio for barley and oats grown alone) was a good index of the resistance of barley varieties to soil acidity. The varieties Vega, Stella and Halikko, known to be resistant to soil acidity, had the highest competition coefficients. The correlation between the competition coefficient and the average number of spikelets per oat plant from a mixed stand was very high. It was considered that a test series, using barley and oats grown together, would be sufficient to distinguish between barley varieties susceptible and resistant to soil acidity. F. S.—R.B.

1161 Mattingley, G. E. G. and Widdowson, F. V. **Uptake of phosphorus from $^{32}$P-labelled superphosphate by field crops.** *Plant and Soil* 1958, **10**, No. 2, 161–75, bibl. 14. [Rothamsted Exp. Sta., Harpenden, Herts]

In trials at Rothamsted during 1953–5, studies were made of the yield and P uptake of barley receiving superphosphate containing either non-radioactive P or $^{32}$P as a tracer at rates of 5 lb. P/ac. when drilled with the seed, or 10 lb. P/ac. when broadcast on the soil surface. In one year, rates of 10 lb. P/ac. drilled with the seed and 20 lb. P/ac. broadcast were also used. Yields of straw and grain and P uptake were reduced slightly by the use of radioactive P. The percentage recovery of P drilled with the seed was greater at all growth stages than that of broadcast P. Both drilled and broadcast P increased the uptake of soil P by the barley. F. S.—P.J.B.

1162 Brian, P. W. **Effects of gibberellic acid on plant growth and development.** *Chem. and Industr.* 1959, No. 6, 183. [Akers Res. Lab., I.C.I. Ltd]

This is a summary of a paper read at a meeting of the Society of Chemical Industry on 5 Dec., 1958. General information is given on the effects of GA on plants. A potential use for GA is in the malting of barley, which is accelerated by the addition of this acid (according to results in Sweden, the optimal amount is 2–3 mg. per kg. of barley). E.B.O.

1163 Leafe, E. L. **Spraying of barley with 2,4-dichlorophenoxyacetic acid.** *Nature, Lond.* 1959, **183**, No. 4661, 621–2, bibl. 1, illus. [Res. Dep., Boots Pure Drug Co. Ltd., Lenton Exp. Sta., Nottingham]

The author's tests show that, while translocation within sprayed barley plants may be a contributory factor in their increasing resistance with age to damage by plant growth-regulator herbicides, the stage of development of the leaf or spikelet primordia must be regarded as a major factor governing susceptibility to damage.—M.H.

1164 Kinebuchi, M. and others. **Studies on sterility in lower spikelets of barley. 4. Relation between development of spikelets and top-dressing of nitrogen fertilizers at the stage of flag-leaf emergence.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 125–6, bibl. 1. [Hokuriku Agric. Exp. Sta.]

1165 Widdowson, F. V. and others. **The value of calcium nitrate for spring-sown cereals.** *J. agric. Sci.* 1959, **52**, No. 2, 200–6, bibl. 5. [Rothamsted Exp. Sta., Harpenden, Herts]

Seven experiments on spring barley and 5 on spring wheat in 1955–7 compared dressings of ammonium sulphate and calcium nitrate applied to the seedbeds at 0·3 and 0·6 cwt. N/ac. For barley, drilling ammonium sulphate with the seed consistently produced higher yields than broadcasting; with calcium nitrate at 0·3 cwt. N/ac. drilling was superior to broadcasting, but the reverse was true at 0·6 cwt. N/ac. because the fertilizer retarded germination and early growth. Broadcast dressings of both fertilizers gave higher yields of wheat than combine-drilled dressings. There is a considerable risk of fertilizer "scorch" when compound fertilizers containing all their N in nitrate form are combine-drilled at rates sufficient for maximum yield. This risk may be discounted when adequate rain follows drilling, but the check to germination may be sufficient to reduce yields in dry spring weather, on light soils and on badly-prepared seedbeds. When broadcast on the seedbed, calcium nitrate and ammonium sulphate gave similar yields and N contents of both crops. Nitrates applied at sowing time to cereals grown in the drier parts of England do not appear to be leached out of the root-zone before they can be taken up by crops. The low rate of both fertilizers had practically no effect on the % N in barley grown in 1955 and '56; the higher rate caused small increases in the N content of the grain. In 1957, the uptake of the fertilizers was retarded by low rainfall in March-June and both rates caused considerable increases in the % N in the grain. To obtain full yields of stiff-strawed varieties of spring barley and spring wheat, 0·5–0·6 cwt. N/ac. should be applied at sowing. Ammonium sulphate and calcium nitrate are

equally suitable for this purpose, except that combine-drilling of nitrate may reduce germination and yield under dry conditions. F.s.—A.M.H.

1166 Arnold, R. E. **The effect of harvest damage on the germination of barley.** *J. agric. Engng Res.* 1959, **4**, No. 1, 24–9, bibl. 3, French, German and Spanish summaries. [Fld Investig. Dep., Nat. Inst. Agric. Engng, Silsoe, Beds]

Malting barley was combine-harvested at about 18 or 24% moisture content, using 5 different cylinder speeds and concave clearances. The grain was dried immediately after harvest, cleaned and stored under favourable conditions. Tests were carried out at intervals during one year to ascertain the effects of the harvest treatments on the germination of the grain and its susceptibility to mould. There was little difference in germination between the grain harvested at the 2 moisture levels, but both high cylinder speed and a small concave clearance caused damage. The effect of high cylinder speed was of only slight importance at wide clearances. F. s.—A.M.H.

1167 Hughes, J. M. and Mitchell, T. J. **Through-circulation drying of vegetable materials. 5. Barley grain.** *J. Sci. Fd Agric.* 1959, **10**, No. 1, 39–45, bibl. 8. [Dep. Chem. Technol., Royal Coll. Sci. Technol., Glasgow]

The rate of drying of shallow layers of grain depended largely on the dry-bulb temperature ; mass air-flow had a less marked effect and wet-bulb depression almost no effect. In drying deep beds, mass air-flow had a much greater influence on the drying rate. F. s.—A.M.H.

1168 Kreyger, J. Onderzoek betreffende het drogen en bewaren van graan in 1957. **[Research on the drying and storage of grain in 1957.]** *Tien-jarenplan voor Graanonderzoek 1957*, [n.d.], 108–17, illus. [Inst. Bewar. Verwerk. Landbouwprod., Wageningen]

French methods for drying and storing grain were studied and are discussed. Among fundamental studies reported was an experiment to determine the temperatures at which barley with different degrees of moisture content must be kept in order to preserve germination for 10 and 30 weeks, respectively. To maintain the germination of seed with 20, 18 and 16% moisture content for 10 weeks, storage temperatures of 7°, 13° or 20°C. were needed and to maintain germination for 30 weeks, temperatures of about 4°, 7° and 13°C., respectively, were needed.—G.M.R.

## MAIZE

*See also Abs. 1209, 1279, 1286, 1288, 1440, 1483, 1561, 1562, 1575, 1583, 1584, 1597, 1640, 1644.*

1169 Mota, F. S. O clima do Rio Grande do Sul em relação ao rendimento do milho. Época do plantio ideal e fatôres climáticos que a determinam. **[Climate in Rio Grande do Sul (Brazil) in relation to maize yields. Optimal sowing date and climatic factors which determine it.]** *Lavour. arroz.* 1958, **12**, No. 141, 33–8, bibl. 6, maps.

A map shows the suitability of various areas in Rio Grande do Sul for growing maize, and another the best sowing dates in various areas. [See also *Fld Crop Abstr.* 9 : 1118 and 12 : 627.]—E.B.O.

1170 Ludwig, J. W. and Harper, J. L. **The influence of the environment on seed and seedling mortality. 8. The influence of soil colour.** *J. Ecol.* 1958, **46**, No. 2, 381–9, bibl. 16, illus. [Dep. Agric. Univ. Oxford]

[See also *Fld Crop Abstr.* 12 : 75.] White Horsetooth maize was sown on three dates in the spring of 1955 and 1956 on soils which had been lightly coated with colouring materials to give surface colours ranging from white through yellow, brown and grey, to black. The soil temperature was markedly changed by such treatments, and in the darkened soils this was reflected in both increased ultimate per cent emergence of maize and decreased time for 50% ultimate emergence. It is emphasized that many factors other than soil colour determine soil temperature but that, under field conditions in the spring, the speed and success of establishment are significantly influenced by soil colour. F. s.—M.H.

1171 Spencer, F. M. **Inter-relation of maize population and rainfall.** *Rep. Dep. Agric. Tanganyika 1957 Pt 2* Dar-es-Salaam, 1958, 5. [Regional Res. Sta., Ilonga]

Maize sown on 11 Jan. yielded significantly more when spaced at 42 × 6 in. than at wider spacings. At later sowings differences between spacings were not significant.—A.M.H.

1172 Nezamuddin, S. and Prasad, L. K. **Spacing experiment on maize yield in Bihar.** *Allahabad Fmr* 1958, **32**, No. 5, 159–67, bibl. 8. [Agric. Res. Inst., Sabour, Bihar, India]

Spacing trials with the maize variety Jaunpur were carried out throughout Bihar using spacings of 1·5, 2·0, and 2·5 ft. between rows and 9, 12 and 15 in. between plants in the row. Judging by grain yields, a distance between rows of 2 ft. proved best in N. Bihar and 1·5 ft. in S. Bihar and the hilly tract of Chotanagpur. The best spacing between plants was 12 in. F. s.—D.B.

1173† Specht, G. Versuche zum Anbau von Körner- und Silomais. **[Cultivation trials with grain- and silage-maize.]** *Z. landw. Vers. UntersuchWes.* 1958, **4**, No. 1, 3–36, bibl. 8, English and Russian summaries.

Experiments were conducted in various parts of E. Germany on the time of sowing, spacing, and N-manuring of grain and silage-maize. For grain, the best time of sowing was between mid-April and early May, according to the cultivation zone, soil temperature and the earliness of the variety used. For silage, the best sowing date was early May to 25 May, according to cultivation zone ; sowing later than this resulted in lower yields and an immature crop. In spacing trials with grain maize, the row method (62·5 cm. between rows and 31·25 cm. between plants) and the square-pocket method (2 plants per 62·5 sq. cm.) gave similar yields, but the latter was preferred because it facilitated mechanical cultivation and increased the proportion of cobs and the dry-matter content. The square-pocket method was also preferred for silage maize for cultivation reasons. In N-manuring trials, 60 kg. N/ha. was optimum for grain maize and 60–80 kg. for silage maize. F. Ger. s.—D.B.

1174 Boyd, F. T. **Cultural practices useful in growing field corn on South Florida sandy soils.** *Proc. Soil and Crop Sci. Soc. Fla* 1957, **17**, 226–30, bibl. 3, illus. [Everglades Exp. Sta., Plantation Fld Lab., Fort Lauderdale, Florida] [Received Nov., 1958]

Two maize crops per year were successfully grown on sandy soils in the coastal region of South Florida. Alternate spacings of 30 and 42 in. between the rows were used, with the furrows deepened only between the rows spaced 42 in. apart and fertilizer side-dressings applied between the rows spaced 30 in. apart. Lodging was least when hills of 2 plants were spaced 2 ft. apart in the rows. In lysimeter-tank studies, an 18- to 24-in. water-table gave the best results. The minimum amounts of fertilizer required to produce 100 bu. grain/ac. were 150 lb. N, 40 lb. P and 120 lb. K. Irrigation with warm canal water was used to reduce frost danger.—A.M.H.

1175 Anderson, J. C. and others. **Effect of subsoiling and rotation on yields of corn.** *Agron. J.* 1958, **50**, No. 10, 603–4, bibl. 7. [New Jersey Agric. Exp. Sta., New Brunswick]

Subsoil tillage to a depth of 18 in. combined with a deep application of 2850 lb. ground limestone/ac. and 1000 lb. 20% superphosphate, was carried out in 1949 on land wet to field capacity, which was subsequently sown to continuous maize and to a rotation of maize/wheat interplanted with sweet clover. Subsoil tillage consistently reduced maize yields throughout 1950–3 as a result of soil compaction. By 1953, crop rotation had substantially ameliorated the adverse effects of subsoil tillage. There were significant correlations between maize yields and (a) soil density, (b) stability to water of soil aggregates. F. s.—R.B.

1176 Fehrenbacher, J. B. and others. **Deep tillage and deep fertilization experiments on a claypan soil.** *Proc. Soil Sci. Soc. Amer.* 1958, **22**, No. 6, 553–7, bibl. 4, illus. [Illinois Agric. Exp. Sta., Urbana]

Soil was tilled in August 1955 to a depth of 9, 18, 27 and 36 in., and fertilized with (a) 9 tons limestone/ac., 3630 lb. 0–20–0 (NPK)/ac. and 1452 lb. 0–0–60/ac. Rates (b), (c) and (d) were 2, 3 and 4 times rate (a), respectively. Fertilizer was thoroughly mixed throughout the tilled zone. N at 200 lb./ac. was broadcast in spring 1956 and '57 over all plots, which were then sown to U.S. 13 hybrid maize. Root penetration studies were carried out in 1956 only. The depth of mixing did not increase maize yields, irrespective of the rate of fertilization. In 1956 and '57 treatments (a) yielded 40 bu./ac. more than did corresponding tilled, but unfertilized, plots. Yields were not further increased by treatments (b), (c) or (d), which tended to depress yields where the depth of tillage was 9 in. Fertilization increased maize root penetration, except where high rates of application were combined with tillage to a depth of 9 in. Tillage alone did not influence root penetration. F. s.—R.B.

1177 Bunting, E. S. and Willey, L. A. **Problems involved in the cultivation of maize for fodder and ensilage. 1. The choice of variety.** *J. agric. Sci.* 1959, **52**, No. 1, 95–105, bibl. 48. [Dep. Agric., Univ. Oxford and Nat. Inst. Agric. Bot., Cambridge]

A number of hybrid maize varieties from the USA, Canada, France, the Netherlands and Rhodesia, and the varieties Jaune Gros and White Horsetooth, were sown in late April or early May and harvested in late Sept., or early Oct., before the first killing frost. The earliest varieties began shedding pollen at the beginning of August. White Horsetooth never flowered before mid-Sept. and did not form grain by the time it was harvested, whereas in the early varieties the ear contributed up to 60% of the dry matter at harvest. On average, the hybrids of medium maturity reached a height of about 6 ft. at harvest. The earliest variety, Jaune Gros, reached about 5 ft. and the latest, White Horsetooth, about 7 ft. Relative production of green material was closely related to plant height. White Horsetooth, the intermediate hybrid varieties and the early varieties produced average yields of 25, 20–22 and 18 tons green matter/ac., respectively. The dry-matter contents of the 3 types were 15–20, 19–21 and *c.* 25%, respectively, hence varietal differences in yield of dry matter were less marked than differences in green-matter yield.—A.M.H.

1178 Mancini, E. **I.A.B. 300.** *Maydica* 1959, **4**, No. 1, 5–7, illus. [Ist. Agron. Univ. Bologna, Italy]

A description is given of I.A.B. 300 (from American dent × Italian flint), a new semi-flint maize hybrid suitable for cultivation in central-southern Italy. In trials in many regions of Italy in 1956–8 it yielded more than Wisconsin 270.—E.B.O.

1179 Brandolini, A. **Insubria 295.** *Maydica* 1959, **4**, No. 1, 8–12, illus. [Sta. Sper. Maiscolt. Bergamo, Italy]

A description is given of Insubria 295, a new semi-flint maize hybrid suitable for cultivation in central and southern Italy, derived from American early dent maize × Italian medium-early flint types. In trials without irrigation in many Italian regions in 1956–7 it gave consistently higher grain yields than Wisconsin 270 or the local varieties.—E.B.O.

1180 Trentin, A. Ibridi di granoturco a granella vitrea rossa. [**Maize hybrids with red flint grain.**] *G. Agric. Domen.* 1959, **69**, No. 8, 75, illus. [Ist. Genet. Lonigo, Italy]

In some zones of Italy, especially in the Veneto, where the soils are dry and moderately fertile, it is difficult to replace the local variety Marano Vicentino with dent hybrids. Although Marano yields often less than the dent hybrids, its red flint grain fetches higher prices. The new early hybrids with red flint grain, Ibrido Maliani (already cultivated) and Italo 225 (about to be released) are very similar to Marano Vicentino from which they were bred, but yield more (yields obtained in many regions are tabulated) and have more uniform grain, more ears per plant and longer ears than Marano.—E.B.O.

1181 Maroso, G. Mais ibridi precoci a granella vitrea rossa costituiti dall'Istituto di Genetica di Lonigo. [**Early maize hybrids with red flint grain bred by the Istituto di Genetica, Lonigo, Italy.**] *Agricoltura d. Venezie* 1958, **12**, No. 4, 214–22, bibl. 7, illus.

A description is given of Italo 225 and Italo 268.—E.B.O.

1182† Zucchini, I. Un nuovo mais da foraggio. Il Mielmais cinquanta ad alto contenuto di zucchero. [**A new fodder maize. Mielmais 50 with a high sugar content.**] *G. Agric. Domen.* 1959, **69**, No. 11, 102, illus.

In northern and central Italy the practice is increasing of growing fodder maize in a mixture with *Vigna sinensis* or other legumes, or alone in rows at a density of 10–12 plants per sq. m. in which case it is harvested when the grain is in the milk-ripe stage. In trials in 1958 the fodder maize hybrid Mielmais 50, introduced from America, yielded consistently more, had a higher sugar content, but a lower content of digestible protein than the maize variety Caragua.—E.B.O.

1183 Obregon, F. and Osler, R. D. H-504, nuevo maíz para zonas tropicales. [**H-504, a new maize for tropical regions.**] *Agricultura téc., Méx.* 1957–8, No. 5, 23, illus.

In the humid tropical area of Veracruz State, Mexico, the maize hybrid H-504 yielded 7% more than H-503, until now considered the best hybrid for this region.—E.B.O.

1184 Palacios, G. and Osler, R. D. Nuevos maíces para regiones altas. [**New maize varieties for high regions (in Mexico).**] *Agricultura téc., Méx.* 1957–8, No. 5, 24–5 and 47, illus.

The following maize varieties are recommended for regions at different elevations in the Mesa Central : hybrid H-126 for 1900–2100 m.a.s.l. ; hybrid H-125 for 2000–2300 m. and variety V-10 for the Toluca Valley and other regions above 2400 m.—E.B.O.

1185 Feyerabend, G. Die Unkrautbekämpfung mit chemischen Mitteln im Mais. [**The chemical control of weeds in maize.**] *Dtsch. Landw.* 1959, **10**, No. 3, 120–2. [Biol. Zentralanst. Berlin der Deutschen Akad. Landwirtschaftswissenschaften zu Berlin]

The most effective control of weeds in maize was obtained by pre-emergence treatment with simazin. The treatment recommended is 4 kg. simazin in 1000 l. water per ha. applied a few days after sowing the maize. Besides annuals, simazin controlled such perennials as *Taraxacum officinale*, *Tussilago farfara*, *Cirsium arvense*, *Convolvulus arvensis*, *Equisetum arvense*, *Mentha arvensis*, *Urtica* spp. and *Agropyron repens*. Simazin had no deleterious effect on maize, and yields were as high as from hand-weeded plots. Owing to its low solubility in water its action persists in the soil for some time ; one consequence of this is a narrowing in the choice of following crops. The best means for controlling weeds in maize stands were : (a) maize 5–15 cm. high, 6 kg. hedolit (DNC) in 600 l. water per ha. ; and (b) maize 20–30 cm. high, 1·5 kg. spritzhormit (2,4-D) in 400–600 l. water per ha.—D.B.

1186 Roberts, L. M. and others. Razas de maíz en Colombia. [**Races of maize in Colombia.**] *Bol. téc. 2 Minist. Agric. Colombia* 1957, pp. 159, bibl. 35, illus. [Received Dec., 1958]

From a study of the geographical distribution and botanical, physiological, genetical and cytological characters of 1999 samples of maize collected in Colombia, 23 races were recognized. These were grouped thus : (a) 2 primitive races with small ears and small grains ; (b) 9 races which have probably been introduced ; (c) 12 hybrid races which originated in Colombia. It is suggested that Colombia is not a centre of origin of maize but is a centre of convergence of races, and a centre of

origin of new races which have spread to other countries. [See also Abs. 633.]—E.B.O.

1187 Smith, T. F. and Bailes, J. P. **Germination tests and field stands of corn.** *Pl. Dis. Reptr* 1958, **42**, No. 6, 734, bibl. 2.

Tests were made in 1958 on 33 samples of the seed of 7 different maize hybrids grown in 1954, '55 and '56 and treated with arasan and DDT before storage. There was a correlation coefficient of 0·84 (significant at 1% level) between germination percentages in the field and those obtained by the rolled-towel, cold test. Standard germination tests did not differentiate between seed samples capable of giving field stands of more than 70%. —R.B.

1188 Nishikawa, K. **Effects of temperature and storage humidity upon the respiration of pollen in corn plant.** *Sci. Rep. Hyogo Univ. Agric.* 1957, **3**, No. 1, 11–13, bibl. 7.

The respiration rate of pollen grains of maize reached a maximum when the concentration of sucrose in the medium was 30%, the temperature 40–45°C., and the relative humidity (during storage for 24 hr.) 80%.—D.B.

1189 Urano, K. and others. [**The influence of photoperiod on the height of the highest ear-bearing node in *Zea mays* L.**] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 103–5, bibl. 3, Japanese summary. [Kikyogahara Branch, Nagano Agric. Exp. Sta.]

1190 Ebert, D. Die Ausbildung des Keimwurzelsystems bei Mais in Abhängigkeit vom Reifegrad. [**The development of the root system in maize seedlings in relation to ripening type.**] *Dtsch. Landw.* 1959, **10**, No. 3, 126–8, bibl. 2, illus. [Inst. Landw. Versuchs- u. Untersuchungswesen, Leipzig, E. Germany]

In early-ripening varieties of maize the seedling root system consisted chiefly of tap root, while in late and very late varieties the roots were chiefly adventitious. This offers a means of distinguishing between types of maize ; the test is best carried out about 5 days after emergence. The cause of this difference in root type is not known, but is thought to be physiological.—D.B.

1191 Duncan, W. G. and Ohlrogge, A. J. **Principles of nutrient uptake from fertilizer bands. 2. Root development in the band.** *Agron. J.* 1958, **50**, No. 10, 605–8, bibl. 5, illus. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

A series of glasshouse experiments was carried out with seedling maize in several of which a seedling was grown with its roots in two different containers. Where N and P fertilizer were mixed together in a portion, only, of a soil or vermiculite culture, proliferation of maize roots in the fertilized volume of the culture occurred. Root proliferation, which occurred only where N and P were both present, was due entirely to the increase in rate of growth of the smaller roots ; the rate of growth of the large roots was not affected. Where some of the fertilizer was replaced by mannitol, it was shown that the development of smaller roots was not influenced by the raised osmotic pressure caused by the increase in salt concentration. The uptake of P by the maize plants was affected by the volume of soil fertilized with P, only when N was also present.—R.B.

1192† Blanc, Denise. Contribution à l'étude de la nutrition azotée en culture sur sable. Premier mémoire. Incidence de la teneur en azote de la solution nutritive sur les rendements et l'équilibre parties aériennes-racines du végétal. [**Contribution to the study of N nutrition in sand culture. 1. Influence of the N content in the nutritive solution on yields and the ratio of aerial parts to roots of the plant.**] *Ann. agron., Paris* 1958, **9**, Suppl. 1, 49–69, bibl. 12. [Sta. Agron. Physiol. Vég., Antibes, France]

In sand culture trials with maize, a concentration of 10 milligram equivalents $NO_3$/l. of nutritive solution gave the highest yield of organic matter (roots plus aerial parts, on wet basis). A concentration of 5 m.e. $NO_3$/l. was, however, sufficient for the normal development of maize plants. A direct relationship was found between the nitrate content in the nutritive solution and the ratio of aerial parts to roots.—E.B.O.

1193 Huffaker, R. C. and Wallace, A. **Sodium absorption by different plant species at different potassium levels.** *Soil Sci.* 1959, **87**, No. 3, 130–4, bibl. 11. [Univ. California, Los Angeles]

Extrapolation of absorption curves indicated that nutrient solutions containing K concentrations of the magnitude of 0·04 $N$ would be needed to exclude Na in maize and soyabean when supplied with nutrient solutions containing $10^{-2}$ $N$ Na. The ability of these species to inhibit the passage of Na from roots into the aerial parts seemed to be influenced by both K- and Na-levels in the nutrient solution. F. s.—E.B.O.

1194 Gilmore, E. C., Jr, and Rogers, J. S. **Heat units as a method of measuring maturity in corn.** *Agron. J.* 1958, **50**, No. 10, 611–5, bibl. 7. [Texas Agric. Exp. Sta., College Station]

Ten hybrid and 10 inbred maize varieties were sown on 5 dates between 17 February and 8 May, 1956, and the dates of silking were recorded. Maximum and minimum temperatures (°F.) in

the plots were recorded. Fifteen formulae for calculating the heat requirement necessary for silking were tested using the experimental data, and the coefficients of variation of the resulting answers were determined in order to discover which formula would give the most reliable estimate of heat requirement. Of the 15 methods, the formula which gave the most consistent results was : $\frac{\text{max. temperature} + \text{min. temperature}}{2} - 50°$, provided that daily minimum temperatures below 50°F. were assumed to be 50°F., and that the number of degrees by which the daily maximum temperature exceeded 86°F. was subtracted from the daily mean temperature. The term " effective degrees " was proposed for heat requirements calculated according to this formula. Effective degrees may prove useful for investigating the influence of environmental conditions, other than temperature, on maize maturity.—R.B.

1195 McWhorter, C. G. **Some effects of 3-amino 1, 2, 4-triazole on the respiratory activities of *Zea mays* L.** *Diss. Abstr.* 1959, **19**, No. 7, 1529–30. [Louisiana State Univ., Baton Rouge]

1196 Peters, D. B. and Russell, M. B. **Relative water losses by evaporation and transpiration in field corn.** *Proc. Soil Sci. Soc. Amer.* 1959, **23**, No. 2, 170–3, bibl. 4, illus. [Illinois Agric. Exp. Sta., Urbana]

In experiments in which maize plants were grown in bare soil or soil covered with plastic sheeting, it was shown that 30–50% of the total water loss in uncovered plots was due to transpiration, and the remainder to evaporation from the soil surface. The rate of water use and the total amount of water used were not greatly influenced by a limited range [unspecified] of plant populations. [See *Fld Crop Abstr.* 11 : 72.] —R.B.

1197 Suarez de Castro, F. and Rodriguez, G. A. Efectos de la cal y el fósforo sobre la producción de maíz en suelos de la serie Chinchiná. [**Effects of lime and phosphorus on maize yield in the soils of Chinchiná (Colombia).**] *Bol. téc., Chinchiná* 1958, **2**, No. 20, 1–20, bibl. 24, illus., English summary.

In field trials in 1956–7, a dressing of 50 kg. $P_2O_5$/ha. increased maize yields by 31%, while liming gave no significant increase.—E.B.O.

1198 Hernández, S. R. and Laird, R. J. La humedad del suelo en la primera parte del ciclo en relación al rendimiento del maíz. [**Soil moisture in the first part of the vegetative cycle in relation to maize yield.**] *Fol. téc. 33 Sec. Agric. Ganad., Méx.* 1958, pp. 16, bibl. 8, English summary.

In a trial at the Experimental Station of La Cal Grande, Guanajuato, Mexico, in 1956, maize was subjected to 4 levels of N manuring, viz. 0, 80, 160 and 240 kg./ha., and, during the first 3 months of growth, to 4 levels of moisture, obtained by irrigating when the available soil moisture was reduced to : 75, 50, 25 or 0%. During the last part of the vegetative cycle rainfall maintained adequate soil moisture in all treatments. Results showed that with no N, and with small applications of N (80 and, possibly, 160 kg./ha.) grain yields were lowest in the wettest treatments. With the application of 240 kg. N, grain yields were about the same in the 4 moisture treatments, the average being 7·31 tons/ha., as against 0·87 in the treatment with no N. It is concluded that maize yields are not reduced by moisture deficits severe enough to cause wilting for several days during the first part of the growing season. [See also *Fld Crop Abstr.* 11 : 537.]—E.B.O.

1199 Agricultural Experiment Station, Salisbury. **Annual report of experiments : season 1957/58.** [**Maize**]. *Rhod. agric. J.* 1958, **55**, No. 6, 603–25.

The results of stubble mulching, defoliation and plant population × fertility trials confirmed those of the previous year [see Abs. 617]. In a trial in 1956–7, maize which received no N yielded 13 bags grain/ac. (1 bag = 200 lb.) compared with 21–27 bags/ac. from plots which received N at rates from 50 to 500 lb./ac. at sowing, or 6 weeks later. The residual effects of the N treatments were measured on maize in 1957–8, when all plots received a basic dressing of 260lb. nitrate of soda/ac. The plots which had received no N in 1956–7 yielded 18 bags grain/ac. in 1957–8, compared with 15–16·5 bags/ac. from the plots which received N in 1956–7.—A.M.H.

1200 Hall, C. W. and Rodriguez-Arias, J. H. **Application of Newton's equation to moisture removal from shelled corn at 40-140°F.** *J. agric. Engng Res.* 1958, **3**, No. 4, 275–80, bibl. 8. [Michigan Agric. Exp. Sta., East Lansing]

The drying of shelled maize in a thin layer closely obeyed an exponential law analogous to Newton's law of cooling. The rate constant decreased in a step-wise fashion throughout the drying process and its initial value was greater the higher the initial temperature or initial moisture content. F. s.—A.M.H.

1201 Saldarriaga, A. Estudio de los factores que influyen sobre la efectividad de los insecticidas empleados en la protección de granos almacenados. [**A study of the factors which influence the efficacy of insecticides used for protecting stored grain.**] *Agric. trop., Bogotá* 1958, **14**, No. 10, 619–31, bibl. 8. [Dep. Invest. Agropec., Minist. Agric., Colombia]

Trials were carried out to study the efficacy of lindane at 5 ppm., malathion at 8 ppm., and a mixture of piperonyl butoxide at 17 ppm. plus pyrethrins at 1 ppm., all used as dusts on stored maize grain containing about 13, 18 or 25% moisture. The results were : (a) the efficacy of all the insecticides was reduced as the moisture content of the grain increased ; that of the mixture piperonyl butoxide + pyrethrins was severely reduced at 18% moisture content and that of malathion at 25% moisture ; lindane was least affected by high moisture contents and had a slight fungicidal effect against *Fusarium moniliforme* ; (b) all the insecticides checked the rice weevil [*Calandra oryzae*] ; control was not complete, but sufficient for practical purposes ; (c) none of the insecticides tested reduced germination or seedling vigour. —E.B.O.

1202 Las Casas, E. de and others. El bromuro de metilo. [**Methyl bromide.**] *Agricultura téc., Méx.* 1958, No. 6, 17–19 and 51, bibl. 2, illus.

From a trial at Cortazar, Mexico, in 1956–7, it was concluded that methyl bromide, applied at the rate of 10 c.c./cu. m. of storage room, had no injurious effect on the germinating capacity of maize seed with a moisture content not exceeding 12%, provided that a ventilator was used to circulate the fumigant. At this rate methyl bromide effectively controlled adults of *Calandra* spp. and *Tribolium* spp., but its effect was slow so that 2 or more days elapsed before the insects died. —E.B.O.

1203 Kliewer, W. M. and Kennedy, W. K. **Fungicides used for the storage of moist grain.** *Agron. J.* 1958, **50**, No. 8, 493, bibl. 2. [Cornell Univ., Ithaca, N.Y.]

The chemicals most effective in preventing mould growth in damp, shelled maize in glass jars were 2,4,6-trichlorophenol, 1(2,3)-chloro-4-methyl-2-pentanone, 1-chloro-2-butanone, and the ethyl and methyl esters of 2,-3-dibromopropionic acid. The first 2 chemicals, applied at 0·25% of the weight of maize, and the latter 3 at 0·3%, controlled mould growth for 108 days. Each of the latter 4 chemicals, in combination with the first or with 3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione, prevented mould growth when applied at 0·2%. Visible mould growth was closely correlated with total loss of dry matter and final grain moisture content. The time of first appearance of mould was negatively correlated with total mould growth. Of several fungicides, 2,4,6-trichlorophenol at 0·3–0·4% alone consistently prevented moulding in maize and wheat containing 24–28% moisture and stored in 20-lb. samples in polythene bags for 168 days.—R.B.

1204† Rahmann, M. Betriebswirtschaftliche Untersuchungen zum Silomais- und Futterrübenanbau. [**An agricultural economic investigation on the cultivation of maize for silage, and fodder-beet.**] *Bayer. landw. Jahrb.* 1958, **35**, No. 6, 677–705, bibl. 18, illus. [Inst. Wirtschaftslehre des Landbaues, Tech. Hochsch. München, Weihenstephan, Bavaria]

The various cultivation operations involved in the production of these two fodder crops are studied from the standpoint of in-put/out-put relationships. The work was done within the framework of conditions and government policy in Bavaria.—D.B.

1205† FAO. Rapport de la huitième réunion de la FAO sur les maïs hybrides tenue à Wageningen (Pays-Bas) du 7 au 12 Février 1955. [**Report of the eighth meeting of FAO on hybrid maize held at Wageningen (Netherlands) 7–12 Feb. 1955.**] *Meet. Rep. 1955/7 FAO* 1956, pp. 79. [Received March, 1959]

## SWEET-CORN

1206 Eden, W. G. **Corn earworm control in sweet corn.** *J. econ. Ent.* 1958, **51**, No. 6, 822–3, bibl. 1. [Alabama Polytech. Inst., Auburn]

DDT and thiodan at 2 lb./ac., used to control heavy infestations of *Heliothis zea*, resulted in yields containing 99% undamaged sweet-corn ears. Sevin at 2 lb./ac. afforded equal control, but caused severe foliar injury. F. s.—R.B.

1207 Wressell, H. B. and Driscoll, G. R. **Granulated insecticides for control of the European corn borer in southwestern Ontario.** *J. econ. Ent.* 1959, **52**, No. 1, 49–51, bibl. 8. [Canad. Dep. Agric., Ottawa, Ontario]

Plots of sweet-corn infested with *Pyrausta nubilalis* were treated in 1956 with granulated endrin at 0·5 lb./ac., granulated heptachlor, toxaphene and DDT each at 1·5 lb./ac., and DDT emulsion at 1·5 lb./ac., in 3 applications just before and during flowering. The percentage of marketable ears for the respective treatments was 98, 96, 62, 73 and 80, compared with 2% for untreated control plots. In 1957, granulated endrin at 0·3 lb./ac., heptachlor and DDT each at 1 lb./ac. dipterex at 1·5 lb./ac., and DDT emulsion at 1·5 lb./ac., were similarly applied. The percentages of marketable ears were 93, 96, 85, 92 and 90 compared with 14% for the controls.—R.B.

## SORGHUMS AND OTHER MILLETS

*See also Abs. 1225, 1288, 1440, 1482, 1562, 1575*

1208 Rosbaco, U. La producción de semilla de sorgo híbrido en Estados Unidos. [**The**

**production of hybrid sorghum seed in the USA.**] *Idia* 1958, No. 127, 17–19, bibl. 6.

Data are given of the sorghum area in various States of the USA, of percentages of germination in the laboratory and of emergence in the field, of time in days from sowing to emergence and from emergence to the 4-leaf stage. There are difficulties in ensuring good emergence of sorghum in the field, and this affects yields considerably. The best emergence percentages, 83·5 and 82·5, and the most rapid early growth, were obtained at 30° and 35°C., respectively.—E.B.O.

1209 Reggiani, F. Il sorgo ibrido sugli arenili di Ostia antica. [**Hybrid sorghum on sandy soils at Ostia, Italy.**] *G. Agric. Domen.* 1959, **69**, No. 5, 45, illus.

At Ostia, near Rome, 10 cultivars of sorghum (*Sorghum vulgare*) from the USA, grown for grain, were tested in a dry environment on sandy soil (neutral reaction) in 1957. Sowing took place on 14 May and harvesting during 1–10 Sept. Density was 7–8 plants per sq.m. One irrigation was given during 10–20 July. S-1 gave the highest grain yield, 4200 kg./ha. The average grain yield was 3800 kg. and the yield of leaves and stems, 20,000 kg. per ha. Under the same conditions maize yielded 2500 kg. of grain per ha.—E.B.O.

1210 Skerman, P. J. **Cropping for fodder conservation and pasture production in the wool-growing areas of Western Queensland.** *Pap. Qd Univ. Dep. Agric.* 1958, **1**, No. 3, 89–146, bibl. 24, illus., 1 map.

The chances of receiving sufficient rainfall to grow a sorghum crop for silage in different districts of Western Queensland are discussed. The results are given of trials on the effects of long fallow (18 months) and short fallow (6–7 months) on sorghum yields. The crops after long fallow consistently outyielded those after short fallow. The yield of sorghum following long fallow did not differ significantly from that where it followed a previous crop and received 4 cwt. sulphate of ammonia/ac. The results of fertilizer, variety and spacing trials with sorghum are given. *Phaseolus mungo*, *Ph. aureus*, Cristaudo, Reeves and Poona cowpeas [*Vigna sinensis*] and *Dolichos* spp. were promising for growing in association with sorghum. The possible merits of a fallow/sorghum/legume rotation are noted.—A.M.H.

1211 Skerman, P. J. **University of Queensland Department of Agriculture. Wool research report — 1958.** 1959, pp. 7, mimeo.

In trials at Hughenden, Sugar Drip sorghum yielded 9 tons green matter/ac. when grown in rows 7 in. apart. Yields decreased as the row spacing was increased, the yield at the 42-in. spacing being 6·3 tons/ac., which was significantly below that at any of the closer spacings. There were no significant yield differences between plots rolled after sowing and those left unrolled.—A.M.H.

1212 Leal, C. J. Sorgos escoberos para el noreste. [**Varieties of broom corn for the north-east of Mexico.**] *Agricultura téc., Méx.* 1958, No. 6, 8–9 and 49, illus.

Information is given on growing broom corn [*Sorghum* sp.] in north-east Mexico, a region very liable to drought. Both tall and dwarf types of broom corn are harvested at the milk stage, the former by cutting and the latter by pulling. As a result of a trial in 1955–6, the following varieties are recommended : Rennels No. 11, Japonesa Sta. Efigenia and Scarborough No. 7, dwarf ; Arcola 77, White Italian and Okaw, tall.—E.B.O.

1213 La Vega, J. L. de and others. Resultados obtenidos con sorgo en el Bajío. [**Results obtained with sorghum varieties in the Bajío (Mexico).**] *Agricultura téc., Méx.* 1958, No. 6, 24–5, illus.

1214 La Vega, J. L. de and Osler, R. D. El cultivo del sorgo de " humedad residual " en la faja costera de Veracruz. [**The growing of sorghum on " residual moisture " in the coastal belt of Veracruz (Mexico).**] *Agricultura téc., Méx.* 1958, No. 6, 31–2, illus.

From trials at the Experimental Station at Cotaxtla in 1956–7, it is concluded that sorghum can be grown in the dry season, using the residual moisture from the wet season. The varieties recommended are: Hegari Precoz (sown early Aug.–21 Sept.) and Kafir 1 (sown late Sept.–early Oct.), for grain; and Honey (sown early Aug.–early Oct.), for fodder.—E.B.O.

1215 Matthee, J. J. and Oberholzer, J. J. **The sorghum midge.** *Fmg in S. Afr.* 1958, **34**, No. 5, 17–19, illus. **Insect pests on kaffircorn.** *Fmg in S. Afr.* 1958, **34**, No. 6, 12–15, illus. [Agric. Res. Inst., Pretoria]

Recommended measures for control of sorghum midge [*Contarinia sorghicola*] are : use of varieties with a uniform and brief flowering stage ; cultivation to ensure a uniform stand ; spacing to allow as few side shoots as possible to form ; early planting so that flowering is complete by early January ; eradication of wild *Sorghum* spp. flowering near the crop ; removal of ears which flower before the main crop ; burning any remaining chaff in spring to destroy dormant and hibernating larvae. Similar measures are recommended for control of the aphids *Longiunguis sacchari* and *Rhopalosiphum maidis* attacking sorghum.—A.M.H.

1216 Stanton, W. R. and others. **A chemical basis for the classification of glume**

**colour in Nigerian cultivated sorghums.** *Nature, Lond.* 1959, **183,** No. 4664, 807–8, bibl. 6, illus. [Regional Res. Sta., Minist. Agric., Samaru, Zaria, Nigeria]

1217 Adda, –. Teneurs en amino-acides des différentes variétés de pénicillaires et de sorghos du Sénégal. [**Amino-acid content of different *Pennisetum* and *Sorghum* varieties grown in Senegal.**] *Qual. Plant. et Materiae veg.* 1958, **3** and **4,** 138–51, bibl. 3, German and English summaries. [Cent. Tech. Agric. Trop., Off. Rech. Scient. Tech. Outre-Mer]

1218 Sorenson, J. W. and others. **Research on farm drying and storage of sorghum grain.** *Bull. 885 Texas Agric. Exp. Sta.* 1957, pp. 23, bibl. 4, illus.

The maximum moisture content for the safe storage for one season of sorghum grain in S. Texas was found to be 12% where grain was not turned or aerated. Storage for more than 1 yr. required a moisture content of <11%. Sorghum grain containing 12–14% moisture which was aerated or turned during storage was stored safely for 9 months. Grain with a moisture content higher than 14% could not be stored satisfactorily. The drying of grain containing 18% moisture with unheated air required an air-flow of 2·5 cfm./bu. with a maximum grain depth of 8 ft. It was essential to reduce the moisture content of all grain to 15% within 8 days in order to prevent the growth of moulds. F.S.—R.B.

1219† Hart, J. **Growing millets in Queensland.** *Qd agric. J.* 1958, **84,** No. 12, 703–13, illus.

Information is given on seed-bed preparation, sowing rates and use of herbicides for millets in Queensland. The characteristics are described of : the millets grown for grazing, white panicum and Japanese millet (*Echinochloa crus-galli* vars. *edulis* and *frumentacea*) ; the grain millets, white French millet (*Panicum miliaceum*), dwarf setaria (*Setaria italica*), Korean setaria (*S. italica* var. *purpurea*) ; and the dual-purpose giant setaria (*S. italica*). Nunbank setaria (*S. italica* var.) and bulrush millet (*Pennisetum typhoideum*), which have been grown only experimentally in Queensland, are also described. The suitability of the millets for hay and silage, and the feeding value of the grain, are discussed.—A.M.H.

1220 Portères, R. Les appellations des céréales en Afrique. [**The names given to cereals in Africa.**] *J. Agric. trop. et Bot. appl.* 1958, **5,** No. 6–7, 454–86, bibl. 169.

Information is given on the history, ethnobotany and names given to teff (*Eragrostis tef*) and to finger millet (*Eleusine coracana*). [See also Abs. 151.] —E.B.O.

1221 Willimott, S. G. and Anthony, K. R. M. **The response of *Eleusine* to different forms of nitrogen fertilizer.** *Emp. J. exp. Agric.* 1958, **26,** No. 104, 373–8, bibl. 12. [Yambio Exp. Sta., Res. Div., Minist. Agric., Sudan]

A short review is given of literature on the forms of N applied to annual crops and the yields resulting therefrom. The special position of *Eleusine coracana* as the staple cereal in south-west Sudan is discussed from the viewpoints of soil, agronomy and nutrition. In a preliminary experiment on a dark sandy loam, ammonium sulphate at 80 rotls N/feddan [76 lb. N/ac.] gave a significant increase in grain yield of *E. coracana,* while 40 rotls N/feddan as ammonium sulphate or either rate of N as sodium nitrate increased yields only slightly.—A.M.H.

## RICE

*See also Abs. 1552, 1575, 1576, 1578, 1597.*

1222 Bernardes, B. C. and Bernardes, Ione A. C. Estudo de épocas de plantações de novas variedades criadas na E. E. de Arroz. [**Study of the sowing date for new varieties bred at the Rice Experimental Station (Gravataí, Brazil).**] *Lavour. arroz.* 1958, **12,** No. 143, 13–15. [Esta. Exp. Arroz, Gravataí, Rio Grande do Sul, Brazil]

The best sowing date for 7 new rice hybrids, investigated by sowing at 15 day-intervals from 15 Sept. to 15 Dec., was: for the varieties 402, 302 and Guaíba, Sept.–end-Oct.; for 401 and 301, Sept.–end-Nov. ; for 403 and 303, Oct. The seeds of 401, 402 and 403 (long grain) and 301, 302 and 303 (medium grain) will be distributed for sowing in 1959–60.—E.B.O.

1223 Simonneau, P. La riziculture dans les terrains salés d'Oranie (1951–1955). [**Rice-growing in the saline soils of the Oran Department (Algeria) during 1951–5.**] *Bull. 2 Gouv. gén. Algérie Sect. Pédol. Agrol.* [n.d.], pp. 47, illus., bibl. 8. [Summary seen in *Agron. trop., Nogent* 1959, **14,** No. 1, 80–1.]

Rice was grown, in 1955, on 1650 ha. on the plains of the Habra and lower Chéliff and averaged 4000 kg./ha. There is a possibility of extending this crop to 40,000 ha. of irrigated, saline soils. The principal problem considered is a suitable rotation. It is thought that, once soil salinity has decreased, the following rotation will be adopted : rice/fallow/cotton and a leguminous green-manure.—E.B.O.

1224 Giglioli, E. G. **Mechanized rice production at the Mahaicony-Abany Scheme, British Guiana.** *Trop. Agric., Trin.* 1959, **36,** No. 1, 2–14, bibl. 4.

Dual-purpose drainage and irrigation channels were unsuitable for mechanized rice production. The cultivation procedure used on the scheme is discussed and the technique of wet seedbed cultivation is described. Various manual sowing methods were successful. These included broadcasting dry seed on to flooded soil and withdrawing the water after 24–48 hr., and broadcasting germinated seed on to flooded soil, which is afterwards drained or on which the water is allowed to stand. Withdrawal of water was preferable, to minimize seedling drift. Unless water was moved frequently and vigorously through a dry-sown crop, marked signs of " burning ", followed by stunting, infestation by water weevils (*Lissorhoptrus* sp.) and unthriftiness occurred. Wet-cultivated crops required only about half the amount of water movement needed by dry-sown crops. Wet cultivation gave slightly higher yields, but the difference did not offset the increased costs. Under field conditions, wet cultivation in 4 successive years led to a decrease in yield of 1680 lb./ac. On small plots with perfect water control there was no decrease in yield. Deep ploughing (8 in.) and wet cultivation reduced the incidence of red rice in the crop. The effect of deep ploughing in increasing yield was more reliable than its effect on the incidence of red rice. —A.M.H.

1225† Wit, C. T. de. **Second crop growing during the dry season in Lower Burma.** *Neth. J. agric. Sci.* 1958, **6**, No. 4, 249–55, bibl. 5. [Agric. Res. Inst., Rangoon]

On the clay soils of the Irrawaddi delta, a considerable amount of water can be conserved for growing a second crop after rice, provided that the fields are ploughed while still wet, immediately after the harvest. Estimated yields of cowpeas (*Vigna sinensis*) grown after rice, based on evapotranspiration data, are 330 kg. seed/ha., and for *Sorghum* spp. about 4000 kg. dry matter/ha. F.s.—R.B.

1226 Have, H. ten. De invloed van het tijdstip van de oogst op de kwaliteit van enkele rijstrassen. 1. **The effect of date of harvest on the quality of some rice varieties. 1.** *Surinaam. Landb.* 1958, **6**, No. 2, 40–53, bibl. 3, English summary. [Stichting Machinale Landbouw in Suriname]

Germinated seed of the long-grained rice varieties Dima, Nickerie, SML 80/3/1/5/5, SML 80/3/1/6/7 and Paradijs, was sown at 90–100 kg./ha. in flooded, uniformly-fertilized fields. Sowing took place in 1956 on 15 May, 25 May, 24 October and 9 November, and in 1957 on 13 April and 3 May. Grain was harvested on 9 consecutive dates between 133–160 days after sowing, threshed the same day and the moisture-content of the grain determined. The seed was then dried in the sun to 10·8–12·8% moisture-content, and stored in air-tight boxes for several months, after which milling tests were carried out. Nickerie ripened first and the grain matured most rapidly. Dima had a higher moisture-content than Nickerie on all harvesting dates. The other varieties ripened fairly rapidly, but were somewhat later than Nickerie and Dima ; Paradijs ripened last and had the largest grains. Yields of milled rice were lowest in Paradijs. The average percentage of chaff and half-formed grains was 4·6 for rice harvested early, and 2·9 for rice harvested late, whereas the average percentage of shelled and broken grain increased during this period. With progressively later harvesting the percentage of broken grains in each variety decreased to a minimum and then increased. Low moisture-content at harvest appeared to be associated with increased grain breakage. When harvested at the correct stage of maturity there was relatively little difference between varieties in the percentage of broken grains.—R.B.

1227 Eynard, I. Possibilità e limiti della coltura del riso nel Baluchistan iraniano. [**Possibilities and limitations of rice-growing in Baluchistan, Iran.**] *Riso* 1958, **7**, No. 11, 6–8, bibl. 5, illus., English and French summaries. [Ist. Agron., Univ. Torino, Italy]

1228 Viali, G. Il riso nel mondo ed in particolare in Italia. [**Rice in the world, particularly in Italy.**] *Ital. agric.* 1959, **96**, No. 2, 155–9, illus.

Information is given on rice, particularly yields, total production and the areas grown in various countries. In 1958 Spain had the highest average yield, 5774 kg. of rough rice per ha., followed by Italy with 5182 kg./ha.—E.B.O.

1229 Garboua, M. Conditions et mauvais état du drainage dans le delta du Rhône. Nombreux inconvénients des drains tertiaires à ciel ouvert et nécessité d'y remédier en leur substituant des drains couverts plus efficaces et plus pratiques. [**Bad drainage conditions in the Rhône delta. Many disadvantages with third-order open drains and the need for replacing them with more effective and practical covered drains.**] *Riz et Rizicult.* 1958, **4**, No. 4, 149–52, English and Spanish summaries.

In the Camargue, where rice-growing has developed considerably, the drainage system is inadequate. A project is under study for diverting the rice-fields' drainage water from the Vaccares pool to the Rhône thus allowing the lowest-lying lands to be drained. It is recommended that third-order open ditches in privately owned rice-fields should be replaced with underground enclosed drains.—E.B.O.

1230 De Beni, U. Olmo, nuova varietà di riso fino. [**Olmo, a new fine-rice variety (in Italy).**] *Riso* 1959, **8**, No. 3, 10–11, illus.

A description is given of Olmo which matures in 157 days. It was selected by the " Società Produttori Sementi ", Bologna, and released in 1958. It yielded 8800 kg./ha., when sown, and 9431 kg./ha. when transplanted, compared with 7581 and 8150 kg., respectively, from Arborio, one of the best fine varieties.—E.B.O.

1231 Tinarelli, A. Una nuova varietà di riso " Trionfo Fassone ". [**Trionfo Fassone, a new rice variety.**] *Riso* 1958, **7**, No. 9, 8–10, illus.

A description is given of Trionfo Fassone, selected by a farmer in Vercelli province, Italy. It is of the fine type and has a vegetative cycle of 175–180 days. It grows 106 cm. tall, is high-yielding and resistant to lodging.—E.B.O.

1232 Niles, J. J. **A note on Mas – an Indonesian variety of rice.** *Trop. Agriculturist* 1957, **113**, No. 2, 153–6. [Dep. Agric., Ceylon]

The variety Mas yields well in Ceylon, but is said to flower irregularly and to store badly. First-flowering of individual plants occurred over an interval of 23 days for the variety Murungakayan and of 40 days for Mas (100 plants of each variety were examined). Irregular flowering in Mas is explained by this wide range in flowering dates between plants. The viability of dry seed of Mas was maintained satisfactorily in air-tight containers (85% germination capacity after 1 year), but that of seed stored in jute bags declined rapidly.—E.B.O.

1233 Ciferri, R. Le malerbe delle risaie pavesi e vercellesi prima e dopo il diserbo. [**The weeds in the rice-fields of Pavia and Vercelli provinces (Italy) before and after weeding.**] *Riso* 1958, **7**, No. 11, 9–12, illus.

See also *Fld Crop Abstr.* 11 : 1495.

1234 Goarin, P. Destruction par avion des mauvaises herbes des rizières. [**Use of aircraft for controlling weeds in rice-fields.**] *Riz et Rizicult.* 1958, **4**, No. 4, 167–74, bibl. 4, illus., English and Spanish summaries. [Cent. Rech. Agron., Alaotra, Madagascar]

After trials lasting 2 years the use of aircraft for chemical weed control has gradually increased, in rice-fields established on reclaimed marshes in Madagascar, from 50 ha. in 1955 to more than 1000 ha. in 1958. Information is given on this method of weed control which has resulted in increases of 500–1000 kg. of grain per ha. The Na salts of 2,4-D in aqueous solutions gave excellent results when applied in a dry period, but the heavy esters in oil are preferable in rainy weather. Treatment with heavy esters had a residual effect on the tuberous Cyperaceae, mainly *Eleocharis plantaginea*, which did not grow in the year following treatment.—E.B.O.

1235 Vargas, B. A. El " arroz rojo " en nuestros arrozales. [**Red rice in our rice-fields.**] *Suelo tico* 1958, **10**, No. 40, 108–9.

Recommendations are made for avoiding the spread of red rice in rice-fields in Costa Rica.—E.B.O.

1236 Srivastava, M. G. **Effect of hormone herbicides on paddy (*Oryza sativa* L.).** *Proc. Nat. Inst. Sci. India B* **24**, No. 5, 258–71, bibl. 13, illus. [Bose Inst., Calcutta]

In a field experiment, MCPB and the amine, ester, and Na salt of 2,4-D were each sprayed at concentrations of 1000, 2500 and 5000 ppm. on rice (var. ' Aman ') at 3 growth stages, viz. about 6 weeks after germination, pre-flowering and post-flowering. All 4 herbicides were detrimental to growth, yield and seed fertility, MCPB being more harmful than 2,4-D. Injury increased with concentration of the herbicide. Spraying at an early stage inhibited growth, spraying at the pre-flowering stage caused the greatest sterility and decrease in yield. This decrease was accompanied by the presence of abnormally formed ears. Growth substances used as herbicides in rice fields should therefore be applied when the rice is in an early stage of development. If this coincides with the pre-flowering stage of the weed species the herbicide will reduce seed setting in the weed. F.S.—D.B.

1237 Nonaka, F. and Iwata, T. **On the influence of sheath stripping to the severity of rice stem rot (*Leptosphaeria salvinii* Cat.) of lower-part of rice plant.** [Japanese] *Sci. Bull. Fac. Agric. Kyushu* 1958, **16**, No. 4, 473–9, bibl. 18, English summary.

Stripping the sheaths from the lower part of the rice stems, during the period between the milk stage and 2 weeks before harvest, removed the pathogen of rice stem-rot (*L. salvinii*) and delayed maturity, so helping the plant to avoid severe damage. F. Eng. s.—D.B.

1238 Piacco, R. Difendersi dai Chironomi. [**Control of *Chironomus* sp.**] *Riso* 1958, **7**, No. 11, 16–18, bibl. 8, illus.

Information (derived from a paper by J. Risbec, 1952, concerned with rice-fields in southern France) is given on the chemical control of insect larvae, mainly *Chironomus thummi* and *Cricotopus trifasciatus*, affecting rice crops in Italy.—E.B.O.

1239 Shiratori, K. and others. **Researches on the technical improvement of rice**

**culture on ill-drained fields. 4. Studies on the occurrence of the so-called " akagare " disease. 5. Effects of foliar spray of urea, etc. on the " akagare " rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 35–6, bibl. 4, English summary. [Chiba Agric. Exp. Sta.]

In plants sprayed with urea-potassium or urea-manganese the carbohydrate content increased, root systems improved and akagare disease was suppressed. F. Eng. S.—D.B.

1240 Cunha, J. M. A. and Baptista, J. E. Estudo da brança do arroz. 1. Combate da doença. [**A study of " straighthead " of rice. 1. Control of the disease.**] *Agron. lusit.* 1958, **20**, No. 1, 17–64, bibl. 23, illus., English summary. [Esta. Agron. Nac., Sacavém, Portugal]

Straighthead is a serious disease of rice in Portugal. In recently flooded soils with a high content of minerals and organic matter, straighthead disappears after a few years. The investigations described, in progress since 1955, were carried out mainly to study the effects on this disease of applying mineral elements, separately or in combination, on poor soils. Greater concentrations of Mn were found in plants affected by straighthead than in normal plants. The main conclusions were : (a) the application of N, P, K, Ca, Mg, S, Fe, Mn, Cu, Zn, B and Mo either reduced considerably, or eliminated, straighthead ; (b) of the mineral elements applied alone, only Cu prevented, or reduced markedly, straighthead in every case. The results from both the chemical analyses and the field trials support the assumption that straighthead arises from a reduction of mineral elements in soils subject to continuous irrigation. The effect shown by Cu in preventing straighthead is attributed to its oxidizing power on other elements, mainly in the soil but possibly also in the plant. In the case of very poor soils, straighthead was not prevented by the application of Cu alone, but a mixture of all the essential elements was required.—E.B.O.

1241 Sementi Elette. La vermiculite quale substrato per le prove di germinazione del riso. [**Vermiculite as a substratum for germination tests with rice.**] *Sementi elette* 1958, **4**, No. 6, 67–8.

Vermiculite has been found to be a suitable substratum for germination tests with rice, mainly because of its great water-absorbing capacity.—E.B.O.

1242 Misra, G. and Mishra, D. **Effects of sulphanilamide on an early variety of rice.** *Curr. Sci.* 1959, **28**, No. 1, 30, bibl. 7. [Ravenshaw Coll., Cuttack, India]

Seeds of the early rice variety, N.136, were treated with sulphanilamide in 2 series : (1) seeds were soaked for 48 hr. in sulphanilamide solutions at 1, 10, 100 and 1000 ppm. ; (2) after soaking as in (1) the seedlings were sprayed weekly, from 3 weeks old to panicle emergence, with the solution corresponding to that in which the seeds had been soaked. A low concentration (1 ppm.) slightly stimulated shoot elongation and the production of tillers and leaves ; it also brought forward flowering (by 0·7 days). 10 ppm. was almost without effect ; 100 and 1000 ppm. had depressing effects on growth and delayed flowering by several days. —D.B.

1243 Dore, J. and Thevan, P. V. **Studies on seed germination and seedling growth in rice** (*Oryza sativa* **L.**). *Trop. Agric., Trin.* 1959, **36**, No. 1, 15–34, bibl. 32. [Dep. Agric., Kuala Lumpur, Malaya]

A factorial experiment with Siam 29 rice, using pots 18 in. in diameter, included the following treatments : seed uncovered or covered with 0·25 in. soil ; no fertilizer or 12 g. of a 3 : 1 : 1 ammonium sulphate/ double superphosphate/muriate of potash mixture per pot ; soil surface moist, covered with stagnant water or covered with running water. In all water treatments, the initial rate of germination and the final % seedlings established was highest with unfertilized, uncovered seed. Stagnant water caused the greatest reduction in germination (81%) and running water the least (34%). The decrease in germination due to covering the seed was also least in stagnant water. The effect of the treatments on the % distribution of seedlings with different leaf numbers is shown. The depressant effect of fertilizers on germination was reduced when monoammonium phosphate or $CaCN_2$ was used instead of ammonium sulphate and when lime was added to the ammonium sulphate. These differences were attributed to changes in the pH and redox potential of the soil. The effects of low $O_2$ concentration, N fertilizers and other environmental factors are discussed.—A.M.H.

1244 Moriya, M. and Sato, S. **Effect of phosphate on the hardiness of rice seedling transplanted under bad climatic conditions. 1. Amount of phosphate fertilizing in upland seed-bed and the character of seedling grown therein. 2. Effect of various treatments with phosphate on rice seed.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 40–2, bibl. 9, English summary. [Miyagi Agric. Exp. Sta.]

Seedlings grown in an upland seed-bed with adequate levels of $P_2O_5$ fertilizer had good phosphate reserves and a high starch content. On being transplanted, such seedlings showed better adaptation to poor environmental conditions (low temperature, low light intensity), better rooting

ability, growth and yields than seedlings grown with lower levels of phosphate. Coating seeds with agar containing phosphate promoted root growth. F. Eng. s.—D.B.

1245 Ōta, Y. and Yamada, N. **Physiological character of rice seedlings. 3.** *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 28–30, bibl. 4, Japanese summary. [Nat. Inst. Agric. Sci.]

Growth, chemical composition and nutrient absorption of seedlings taken from upland and lowland nursery beds were studied during the 30 days following transplanting (into pots), the seedlings being grown under (a) moderate temperature and (b) low temperature. The temperature difference between (a) and (b) fluctuated between 2 and 5°C. Under low temperature, the upland seedlings were superior to the lowland seedlings in all 3 above-mentioned respects. The upland seedlings should therefore make better early growth than lowland seedlings when transplanted in cooler regions or to poorly drained paddy fields.—D.B.

1246 Sato, T. and others. **The influence of the qualities of rice seedlings on growth and tillering after transplanting.** [Japanese] *Sci. Rep. Hyogo Univ. Agric.* 1957, **3**, No. 1, 22–5, bibl. 5, English summary.

1247 Sekiya, F. **Studies on the tillering primordium and tillering bud in rice seedlings. 7. Development process of the tillering primordium and tillering bud.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 75–6, bibl. 4, illus., English summary. [Yokohama Nat. Univ.]

1248 Pelerents, C. Étude du système radiculaire du riz de terre ferme en conditions naturelles. [**A study of the root system of upland rice under natural conditions.**] *Bull. agric. Congo belge* 1958, **49**, No. 5, 1269–89, bibl. 8, illus., Flemish summary. [Div. Pl. Vivrières, INÉAC, Yangambi, Belgian Congo]

In the forest areas of the Belgian Congo, upland rice is a staple food crop and studies on its cultivation are in progress. In this paper, the techniques for taking root samples and for analysing them in the laboratory are described. An account is given of investigations on : (a) the root development of the rice variety R 55 (selected at Yangambi) throughout its life in a particular type of soil ; (b) the behaviour of R 55 in 3 soil types (sandy, clay, and sandy-clay) ; (c) the comparative growth of the varieties R 55, E 12 (from the USA) and E 411 (from Japan), in 2 soil types (clay and sandy-clay). The principal conclusions were : (a) 40% of the roots of R 55 were formed during the first 60 days of growth and the remaining 60% between the 60th and 90th days ; thereafter there was no increase in root-length or -weight ; the above-ground part developed in almost the same way as the root, the increase in weight after the 90th day being due solely to grain formation ; (b) rice plants developed in almost the same way in the 3 soil types during the first 60 days, thereafter development of the root was greater, and that of the above-ground part, smaller, the lighter the soil ; in sandy soil the root weight was double that in clay soil, while the above-ground part was 20% lighter ; the root-hairs were, however, more developed in the clay- than in the sandy-soil ; (c) the differences between the root systems of R 55 and E 12 were small ; differences between these varieties and E 411 are attributed to the fact that the latter is not adapted to upland cultivation. —E.B.O.

1249 Fujii, Y. **Studies on the correlation between number of the vascular bundles in leaf and arrangement of the roots at the node in rice plants.** *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 67–70, bibl. 9, illus., English summary. [Fac. Agric., Saga Univ.]

1250 Shibuya, T. **Histogenesis of cortical lacunas in rice roots.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 17–20, bibl. 24, illus., English summary.

1251 Doi, Y. and Yamagata, M. **Further studies on the roots of rice plants by means of transparent plastic pots.** [Japanese] *Bull. Fac. Agric. Yamaguti* 1958, No. 8, 713–22, bibl. 4, illus., English summary.

Roots of rice plants grown on " degraded " soil were white and severely damaged by this soil, while those grown on good soil had a brown coating of ferric oxide and were mostly uninjured. Tilling and weeding caused roots to spread laterally while ridging and weeding caused them to penetrate more deeply into the soil. The reducing action of paddy soils was injurious to rice roots, but on the non-weeded plot (control) this injury was surprisingly light. It is suggested that this could be attributed to the oxidizing action of the roots of weed plants. F.Eng.s.—D.B.

1252 Aimi, R. and Fujimaki, K. **Cell-physiological studies on the function of root. 1. Chemical and enzymatic constitution associated with the structural differentiation of root in rice plant.** *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 21–4, bibl. 10, illus., Japanese summary. [Nat. Inst. Agric. Sci., Tokyo]

The distribution of several chemical constituents including enzymes was determined in the rice root. The localization pattern of each chemical constituent is shown diagrammatically. Dehydrogenase proved to be the most useful constituent for

determining root viability. Its activity was very high throughout young roots and in meristems of mature roots ; it was less active in older parts of mature roots and absent from dying and dead roots. It was satisfactorily determined by the tetrazolium reaction.—D.B.

1253 Yoshida, T. and Takahashi, J. **Studies on the metabolism in roots of lowland rice. 1. Interrelationship between roots and shoots in mineral nutrition of rice plant.** *Soil Pl. Fd* 1958, **3**, No. 4, 182–6, bibl. 15. [Nat. Inst. Agric. Sci.]

Using the water-culture technique and the rice strain Norin No. 25 (*Oryza sativa* var. *japonica*), seasonal changes in the inorganic constituents of the root and shoot were studied. With the exception of Fe, which accumulated in the root, the concentration of inorganic nutrients was higher in the shoot than in the root. In young plants, the roots contained about 25% of the total amount of each nutrient absorbed. This subsequently decreased to 5–10%. The seasonal changes in the concentration of N, P, K and Mg, but not Si, followed a parallel course in root and shoot. F. s. —D.B.

1254 Yamada, I. **On the artificial germination of pollen of rice. 6. Protoplasmic streaming in pollen tube. 7. The relation between temperature and protoplasmic streaming.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 58–60, bibl. 11, English summary. [Fac. Agric., Kyoto Univ.]

At room temperatures, the rate of protoplasmic streaming in germinating pollen tubes of Japanese varieties of rice was at first very high, then decreased ; in 2 non-Japanese varieties the rate was low throughout growth of the tube. In Japanese varieties the rate of streaming increased with temperature and reached a maximum at 30°C. F. Eng. s.—D.B.

1255 Moriwaki, T. **Studies on responses of rice plants to cold water irrigation. 1. On varietal differences of the number of pollens adhered on the stigma.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 43–4, bibl. 5, English summary. [Kyoto Univ.]

This is a study of varietal differences in sterility of rice. Four varieties of rice of differing resistances to cold-water irrigation were grown in plots with irrigation water at 4 different temperatures. The development of anthers and pollen grains during flower development and the germination of pollen grains on stigmas were studied. At the lower temperatures of irrigation water fewer pollen grains adhered to stigmas than at the higher temperatures. There was a positive correlation between varietal resistance to cold-water irrigation and the number of pollen grains adhering to the stigmas. Varieties which were not resistant to cold-water irrigation had smaller anthers than the resistant varieties. F. Eng. s.—D.B.

1256 Oka, H. I. **Photoperiodic adaptation to latitude in rice varieties.** *Phyton* 1958, **11**, No. 2, 153–60, bibl. 20. [Nat. Inst. Genetics, Misima, Japan]

In experiments lasting 3 years in Taichung, Formosa, where temperatures during May-Sept. are constantly high and rice can be grown even in winter, 163 varieties of *Oryza sativa* from various Asian countries were tested at monthly intervals for their photoperiodic response, which was computed from the relationship between heading date and the number of days from sowing to heading. All varieties from northern temperate regions, and those from equatorial regions, were insensitive. Both sensitive and insensitive varieties were found in countries between these two extremes. With insensitive varieties, the lower the latitude of the distribution area of a variety, the longer was its growing period. No marked difference in day-length response was found between the indica and japonica groups, except that sensitive varieties of the indica group are predominant in countries in low latitudes, while those of the japonica group are predominant in countries in higher latitudes.—E.B.O.

1257 Asakuma, S. **Ecological studies of heading of rice. 1. Relations between the days from seeding to heading and several conditions. 2. The " basic vegetative growing habit ", " sensibility to day-length", and " sensibility to temperature ", of Japanese rice.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 61–6, bibl. 15, English summary. [Kagoshima Prefec. Agric. Exp. Sta.]

1258 Yamagata, M. **Studies on the limit of possibility of the increase in the number of leaves and grains on the main stem of rice varieties. 2. Influences of long day-length and removing tillers. 3. Influence of sunlight intensity.** [Japanese] *Bull. Fac. Agric. Yamaguti* 1957, No. 8, 693–708, bibl. 11, illus., English summaries.

Observations, limited to the main stem, were made on 5 rice varieties between transplanting and maturity. On cutting off all tillers as they appeared, the number of leaves and grains on the main stem increased, and there was some tendency towards equalization of heading time in early and late varieties. Under continuous light [but retaining tillers], the number of leaves on the main stem increased, while the number of grains increased in late varieties but decreased in early and medium varieties. Heading time was delayed by about 20

days. In strong sunlight, the numbers of leaves and tillers increased and the number of grains decreased. There was a tendency towards equalization of heading time of the main stem in early and late varieties. In weak sunlight, heading time was earlier with a consequent decrease in the numbers of leaves and tillers and increase in the number of grains. [See also *Fld Crop Abstr.* 11 : 1034.] F. Eng. s.—D.B.

1259 YAMAGATA, M. **Studies on the limit of possibility of the increase in number of leaves and grains of the main stem of rice varieties. 4. Influence of sunlight intensity (2).** *Bull. Fac. Agric. Yamaguti* 1958, No. 9, 1001–10, bibl. 5, English summary.

Under strong light intensity (horizontal incidence about 200% normal), the number of tillers, ears and grains per hill increased in several rice varieties, whether grown early or at the normal time. Under weak intensity of light (horizontal incidence 40% normal) and under various combinations of strong, weak, and normal light-intensity, the number of tillers, ears and grains per hill increased with the intensity and quantity of light. F. Eng. s.—D.B.

1260 MURATA, Y. and others. **Studies on photosynthesis in rice plant. 9. Photosynthesis and dry-matter production of rice plants grown with heavy manuring and dense planting. 10. Photosynthetic characteristics and dry-matter production of rice varieties.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 9–14, bibl. 11, English summaries.

1261 FUJII, S. and YOSHIDA, S. **Relation of the nitrogen level in the rice plant to the photoperiodic response.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 71–4, bibl. 14, English summary. [Coll. Agric., Univ. Osaka Prefecture]

1262 TOGARI, Y. and KASHIWAKURA, Y. **Studies on the sterility in rice plant induced by superabundant nitrogen supply and insufficient light intensity.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 3–5, bibl. 4, English summary. [Tokyo Univ.]

An increase in the level of N nutrition and a decrease in light intensity for a month before flowering caused incomplete dehiscence of anthers and abnormal behaviour of anther filaments during flowering. This resulted in decreased pollination and increased sterility. F. Eng. s.—D.B.

1263 MATSUSHIMA, S. and WADA, G. **Analysis of developmental factors determining yield and its application to yield prediction and culture improvement in lowland rice. 47. Studies on the mechanism of ripening (8). Relation of temperature to the rate of translocation of carbohydrates from leaves and culms to grains, and a method for increasing the percentage of ripened grains.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 6–8, bibl. 20, English summary. [Nat. Inst. Agric. Sci., Tokyo]

The sugar-concentration gradient (one of the most important factors determining translocation) in rice plants decreased in this order : leaf-blade > leaf-sheath > culm > panicle. During 20 days after heading, the rate of translocation increased with temperature up to 25°C. above which (up to 29°C. in the experiment) translocation remained constant. In plants with a total N content of less than 1·25%, a N top dressing, applied immediately after heading, increased the percentage of ripened grains. F. Eng. s.—D.B.

1264 HASEGAWA, G. and NISHIKAWA, K. **Seasonal and daily changes of soluble sugar contents in culms and leaves of rice plants.** [Japanese] *Sci. Rep. Hyogo Univ. Agric.* 1957, **3**, No. 1, 7–10, bibl. 7, English summary.

1265 OKAMOTO, Y. **Physiological studies on the effects of silicic acid upon rice plants. 2. Growth and inorganic nutrition of rice plants under insufficient supplies of silica.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 1–2, bibl. 2, English summary. [Yamanashi Univ., Japan]

In plot experiments, the absence of Si from the nutrients reduced the amounts of N, $P_2O_5$ and $K_2O$ absorbed and translocated by rice plants. This reduction was especially marked in the translocation of N and $P_2O_5$ from vegetative organs to the panicle. F. Eng. s.—D.B.

1266 IWAKI, S. and others. **Studies on the salt injury in rice plant. 16. On the variation of salt, nitrogen and carbohydrate content in plant as affected by the salt solutions of various concentrations.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 77–9, bibl. 19, English summary. [Coll. Agric., Ehime Univ.]

As the concentration of salt [NaCl] increased from 0·1 to 0·6% there was a decrease, compared with controls, in dry weight per plant and in the number and size of ears per plant. Heading was delayed by nearly a fortnight and the grain yield per plant was reduced by about 95%. From a study of the seasonal variations in the Cl, N and carbohydrate contents of rice grown with different concentrations of salt, it was thought that the loss in yield per plant was caused by physiological disturbances induced by the production of a surplus of N compounds and a deficiency of carbohydrates. These abnormalities became marked at the 0·5–0·6% salt levels. F. Eng. s. and text table.—D.B.

1267 Boulaine, J. Relations entre la plante et le sol dans les rizières. [**Plant-soil relationship in rice-fields.**] *Bull. 3 Gouv. gén. Algérie Sect. Pedol. Agrol.* 1957, pp. 31, bibl. 33, illus., English and German summaries. [Received Nov., 1958]

In this review of the literature the physiological reactions of the rice plant to environmental conditions are examined.—E.B.O.

1268 Nagato, K. and Ebata, M. **Studies on white-core rice kernel. 1. On the occurrence of white core.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 49–51, bibl. 2, illus., English summary. [Nagoya Univ.]

White-cored rice grains have long been appreciated by brewers in Japan. These grains are larger and heavier than normal grains. N dressings increased and shade decreased the percentage of white-cored grains on a panicle when these treatments were applied at heading. The cause of the phenomenon is thought to be a starch deficiency in the centre of the grain. F. Eng. s.—D.B.

1269 Corbetta, G. and Ranghino, F. Umidità del risone, del riso sbramato, del riso lavorato e rese di pilatura. [**Moisture of rough-rice, husked-rice and milled-rice and milling percentages.**] *Riso* 1958, **7**, No. 12, 8–13, bibl. 5, illus.

In trials with the rice variety Americano 1600, the highest milling percentages were obtained from rough-rice of 14–15% moisture. The moisture content of husked-rice was always higher (sometimes more than 0·5%) than that of rough-rice. The moisture content of first-grade milled-rice was the same as, or slightly higher than, that of rough-rice of moisture content higher than 14–15% ; it was higher than that of rough-rice when this had a moisture content lower than 12%. Rough-rice, recently harvested, absorbed moisture from the air rapidly, while the rate of absorption was slower, and the quantity of moisture absorbed was less, if the rough-rice was a few years old.—E.B.O.

1270 Ramos, M. B. de. **Estimating rice production by using three sampling units.** *Philipp. Agriculturist* 1958, **42**, No. 6, 210–21, bibl. 6. [Univ. Philipp. Coll. Agric., Laguna]

1271 Machado, S. S. Área, produção e variedade de arroz. [**Area, production and varieties of rice (in Rio Grande do Sul, Brazil).**] *Bol. estatís. men.* 1958, **2**, No. 21, 3.

## CAÑIHUA

1272 Raéz, J. L. and others. Experimentos comparativos de variedades de cañihua de Puno y Junín. [**Comparative trials with varieties of cañihua (*Chenopodium pallidicaule*) in Puno and Junín (Peru).**] *Inf. 61 Div. Exp. agric. Minist. Agric. Peru* 1958, pp. 9.

Cañihua, a hardy, native food plant of Peru, grows well at high altitudes, being earlier, and of a higher nutritive value, than quinoa. The price paid locally for its grain is higher than for that of quinoa, wheat or barley which are the principal crops in the high regions of Peru. The area grown with quinoa and cañihua in Peru in 1956 was 28,920 ha.; it is estimated that 25% of this area was actually grown with cañihua (separate figures are not available). The information given on cañihua includes a botanical description and data of chemical composition of its grain (compared with that of quinoa, wheat and barley) which show its high nutritive value. In trials in the Puno department, the varieties which yielded best were Blanca de Puno (2140 kg. of grain per ha.) and Rosada de Puno (2079 kg.) ; both have a 148-day vegetative cycle. The variety Blanca de Orurillo, recently introduced, was promising. At Junín the best varieties were Blanca de Puno and Morada de Puno, but yields were considerably lower than at Puno.—E.B.O.

## CEREALS — GENERAL

1273† Hayes, J. D. **Triple purpose cereals.** *Fmr's Wkly, Lond.* 1959, **50**, No. 10, 115–7, illus. [Welsh Plant Breeding Station, Aberystwyth]

Results from recent trials are quoted to show that the practice of grazing winter cereals can be adopted with advantage. [See also review article in *Fld Crop Abstr.* 9, Nos. 3 and 4.] — C.L.S.

1274 Livingston, H. G. **Annual report of the Agricultural Officer (Research), Rift Valley Province, 1957.** *Rep. Dep. Agric. Kenya 1957, Vol. 2*, Nairobi, 1959, 135–7.

In a ley-establishment trial, undersowing Danish cocksfoot and Italian ryegrass to wheat in 14-in. rows gave better yields than direct sowing or undersowing to wheat in 7-in. rows or oats in 14-in. rows. The differences were apparent at each of 2 cuts following grazing after the cereal harvest. There were no significant differences between cereal yields from the different treatments.—A.M.H.

1275 Squire, M. J. E. **Crops for silage making.** *Agric. Gaz. N.S.W.* 1958, **69**, No. 10, 505–11, 543, illus.

Information is given on the stage of maturity at which maize, sweet sorghum, Japanese millet [*Echinochloa* sp.], wheat, oats, barley, rye and various legumes should be cut for silage.—A.M.H.

1276 Ministry of Agriculture, Northern Ireland. **Cereal variety trials, 1958.**

*Mon. Rep. Minist. Agric. N. Ire.* 1959, **33**, No. 10, 300–3.

In oat trials at Loughgall, L.275 (Stormont Sceptre) gave the highest yield of grain (39 cwt./ac.) and showed the least lodging at harvest. Steel (Sun II) and Marne each yielded about 37 cwt./ac. In barley trials at 7 centres, Rika gave the highest grain yield (30 cwt./ac.). Over the period 1954–8, Bonus yielded 29 cwt. grain/ac. and Proctor and Freja each yielded 27 cwt./ac.—A.M.H.

1277 Grønnerød, B. Sortsforsøk med vårkorn i fjellbygdene 1947–56. **Variety trials with spring barley, spring wheat and oats in the mountain districts 1947–56.** *Forskn. Fors. Landbr.* 1958, **9**, No. 6, 505–26, bibl. 8, English summary. [Statens Forsøksgård Løken, Valdres, Norway]

Most of the trials reported were carried out at Løken, situated a little north of Lat. 61°N. at an altitude of 550 m. in south-central Norway. During the trial period, the mean monthly temperature and total rainfall during May to August were 11·2°C. and 257 mm., respectively. Even the earliest varieties of wheat and oats were unable to ripen their grain satisfactorily in more than 6 or 7 of the 10 trial years. Only 6-row barleys have hitherto been found suitable for growing in the trial district. Of 6-row barleys tested, Varde gave the highest mean yield of 381 kg. grain/ decare and outyielded Maskin, the standard, by 35 kg. Varde was the most consistent in its ability to mature grain and was recommended for use in the lower-lying areas of the mountain districts of S. Norway ; for higher areas, the earlier varieties Maskin and Jotun were recommended and for areas towards the limit for growing barley, Fløya. The Swedish variety Åsa was also recommended for areas where Varde was too late-maturing. Of spring wheats tested, none was significantly better than Snøgg II, which gave a mean grain yield of 324 kg./decare. Of oat varieties tested, Nidar II and Hein II were the earliest and Hein II yielded significantly more grain than Perle, the standard, which gave 343 kg./ decare. In trials during 1949–56, Strind and Bambu outyielded Perle by a substantial margin. —P.J.B.

1278 Broekhuizen, S. Het observatie-proefveld voor de Veenkolonien in 1957. [**Trial fields for the peat-land settlements in 1957.**] *Tien-jarenplan voor Graanonderz. 1957*, [n.d.], 102–7, illus. [Nederlands Graan-Centrum, Wageningen]

The trial fields are largely devoted to observing the behaviour of different barley and winter- and spring-wheat varieties under peat-land conditions, in order to determine the causes of the lower productivity of cereal crops in these soils, compared with clay soils. The varieties sown in 1956 and 1957 are enumerated, as are the characters desirable in winter- and spring-wheat varieties to be grown in peat-lands.—G.M.R.

1279 Thorpe, H. C. and Dixon, G. E. **Cereals for 1959/60.** *K.I.O. Fortnightly* 1959, No. 475, 3–5.

The choice of wheat, barley, oats and maize varieties for Kenya is discussed. Notes are given on the wheat varieties available and it is concluded that, in the absence of a satisfactory rust-resistant variety, as wide a range as possible should be grown.—A.M.H.

1280† Hesling, J. J. **The efficiency of certain grasses as hosts of cereal root eelworm.** *Pl. Path.* 1959, **7**, No. 4, 141–3, bibl. 5. [Rothamsted Exp. Sta., Harpenden, Herts]

In pot experiments, S22 Italian ryegrass, S23 perennial ryegrass and S143 cocksfoot were each capable of slightly increasing the soil population of *Heterodera major*. S48 timothy gave no such increase. Since these increases are thought to be greater than those which occur under field conditions, grassing-down infested fields is still regarded as a safe procedure.—A.M.H.

1281 Mansfeld, R. Zur Nomenklatur einiger Nutz- und Kulturpflanzen 2. [**The nomenclature of some useful and cultivated plants. 2.**] *Kulturpflanze* 1958, **6**, 237–42. [Inst. Kulturpflanzenforschung, Gatersleben, Krs. Aschersleben, E. Germany]

The authorities are given for the names of species and varieties within the genera *Triticum*, *Avena*, and *Indigofera* (among other genera).—D.B.

1282 Brücher, E. H. Un método rápido para determinar el poder germinativo de semillas de cereales. [**A rapid method for determining the germinating capacity of cereal seeds.**] *Idia* 1958, No. 128, 19–24, bibl. 5, illus.

[See *Fld Crop Abstr.* 3 : 1486]

1283 Dantuma, G. Verslag over kruisingsprogramma en klimaatresistentieonderzoek. [**Hybridization programme and study of resistance to climatic conditions.**] *Tien-jarenplan voor Graanonderz. 1957*, [n.d.], 10–7, illus. [Pl. Breed. Found., Wageningen]

An account is given of 381 hybridizations undertaken in wheat, barley and oats during the fourth year (1957) of a 10-year research programme. Physiological studies have been made on the resistance of cereals to cold, on the sowing of spring wheats of different maturity classes at three different times, and on the response of spring wheat to different daylengths. Some varieties of winter oats are being studied under different vernalization conditions, with a view to determining whether the winter type depends principally upon response to daylength, or whether vernalization also plays a part.—G.M.R.

1284 Dobben, W. H. van. Het effect van hitteschade bij granen tijdens de bloei. **The**

**effect of heat damage on cereals during flowering.** *Jaarb. Inst. Biol. Scheik. Onderz. LandbGew., Wageningen* 1958, 21–8, bibl. 3, English summary.

Barley, oats, rye and wheat, grown in pots in a glasshouse, were exposed to temperatures of 35–43°C. for 8 hr. per day for 2–11 days from the onset of flowering. The number of grains produced per wheat or oat plant showed a sudden decrease where the treatment lasted for 1–2 days. Prolongation of the artificial heat wave beyond 2 days had no further effect on grain numbers. The reduction in grain number was partially offset by an increase in average weight per grain, but this increase gradually disappeared when the exposure was prolonged. In barley and rye there was a decrease in grain number and weight per grain which was proportional to the duration of heat treatment. Wheat and barley were more resistant to heat damage than oats, and considerably more so than rye. This is reflected in the geographical distribution of cereal growing. In the field, rye usually escapes heat damage because of its early flowering. The East German wheat variety Peko was more resistant to heat damage than was the Swedish variety Blanka. Plants of the Ukrainian wheat varieties Melanopus, Narodnaja and Artemovka, grown from seed produced under hot, dry conditions, yielded 4% more grains of 15% greater average weight per grain when exposed to temperatures of 43°C. than did plants of the same varieties grown from seed produced under cool conditions with adequate moisture. A similar, though less marked, result was obtained with Peko wheat.—R.B.

1285 Strygkers, J. L'influence d'un traitement au DNC sur la résistance au froid des variétés de céréales. [**The influence of DNC treatment on the resistance to cold of cereal varieties.**] *Rev. Agric., Brux.* 1958, **11**, No. 9, 1323–9, bibl. 15. [Inst. Agron. Sup., Gand, Belgium]

It has been known since 1952 that, under certain conditions, treating winter cereals in winter with DNC increases the yield of grain and straw (in addition to the increase obtained by controlling weeds). After the heavy, late frosts of 1955–6, it was found, however, that even the most frost-resistant varieties of winter barley, wheat and spelt [*Triticum spelta*] had become more susceptible to cold after treatment with DNC. Winter barley was particularly affected. As to rye, the resistance to cold was lowered only in local varieties, which are being deleted from the official list of Belgian varieties.—E.B.O.

1286 Dobben, W. H. van. Verslag van proefnemingen op het gebied van het fundamentale graanonderzoek. [**Experiments in the field of fundamental research on cereals.**] *Tienjarenplan voor Graanonderzoek 1957*, [n.d.], 78–101, bibl. in text, illus. [Inst. Biol. Scheik. Onderz. LandbGewassen, Wageningen]

The results are reviewed of 4 series of investigations on cereals. The first series was concerned with the N economy of cereals, with particular reference to (a) the use of late applications of N, and (b) the relationship between the N content of spring wheat plants and their dry-weight yields during the course of growth. There was evidence that although spring wheat rapidly took up N applied late in the season, the rate of increase in dry-matter yield was almost unchanged. Plants had a heavy requirement for N during the stage of ear formation and tended to draw on the N contained in the leaves, which caused the lower leaves to die. Late applications of N countered this tendency, thus prolonging the period of assimilation of these leaves. The differences between the effect of early and late N applications on the growth and yield of cereals are discussed. The second series of investigations was concerned with the effect of soil acidity on barley. [See Abs. 1160.] The third series dealt with the effect of heat on the yield and quality of cereals [see Abs. 1284] and the fourth with the reaction of cereals to daylength. Data are given of the number of days to earing of a number of crops grown under 12- or 14-hr. daylengths, or continuous light, in temperatures of 15° or 25°C. Crops used included Pionier 338 and CBI × 3 maize, Petkus spring rye, Libertas oats, Peko spring wheat and a wild red clover. The percentage increase in the number of days to earing as a result of lowering the temperature from 25° to 15°C. for spring wheat, spring rye, oats, CBI × 3 and Pionier 338 maize was 35, 44, 66, 83 and 80 at the most favourable daylength (continuous light for wheat, rye and oats ; 12-hr. daylength for maize) and 21, 27, 53, 98 and 107 at the least favourable daylength, respectively. The need for day-neutral maize varieties for growing in the Netherlands was stressed.—P.J.B.

1287 Ryssdal, J. Aukande tilskot av kalksalpeter til vårkorn. **Increasing supplements of nitrate of lime for spring grain.** *Forskn. Fors. Landbr.* 1958, **9**, No. 6, 473–98, bibl. 13, English summary. [State Exp. Sta., Forus, Norway]

In 7-years' trials, spring-sown cereals received, in addition to the normal spring manuring (25–40 kg. 8% superphosphate, 20–40 kg. 33% K salts, and, except on bogland, 15–25 kg. nitrochalk), the following amounts of nitrate of lime : (a) for wheat and oats, 0, 5, 10, and 20 kg./decare ; (b) for barley, 0, 3, 6, 9 and 12 kg./decare, applied 2 or 3 weeks after sowing. In the case of wheat (Diamant II and Skirne) applying up to 20 kg. supplementary nitrate of lime per decare proved profitable. For the 2-row barley variety Goliat it was not

profitable to use more than 9 kg. per decare, but for the 6-row Jadar II, up to 12 kg. gave profitable results. In the case of oats (Gullregn II and Rygja) it did not pay to apply more than 10 kg. per decare. Results varied much in the different years, a fact which is discussed in relation to the climatic conditions. F. s.—G.M.R.

1288 Whitney, W. K. and others. **Effects of methyl bromide fumigation on the viability of barley, corn, grain sorghum, oats, and wheat seeds.** *J. econ. Ent.* 1958, **51**, No. 6, 847–61, bibl. 14, illus. [Agric. Mktg Serv., U.S. Dep. Agric., Manhattan, Kansas]

Little or no reduction in germination capacity occurred in stored grain when fumigated with methyl bromide, provided that the moisture content of the grain was < 12%, the rate of application was < 2 lb./1000 cu. ft., and the exposure period was < 24 hr. The cereal most resistant to fumigation damage was oats, followed by barley, grain sorghum, maize and wheat. F. s.—R.B.

1289 Horsbrugh, A. S. **Some notes on grain drying — 1957 harvest.** *Econ. Rep. 51 Edinb. E. Scot. Coll. Agric.* 1958, pp. 7.

The costs of installing and running 6 grain-drying plants were studied in relation to seasonal grain prices. It was concluded that, under present conditions, 3·5–11 yr. may be required to recover the capital invested. The possibility of contract or co-operative work may be the crucial factor in the development of farm grain-drying.—A.M.H.

1290 Buelow, F. H. **Drying grain with solar heated air.** *Quart. Bull. Mich. Agric. Exp. Sta.* 1958, **41**, No. 2, 421–9, bibl. 7, illus.

1291 Boyd, D. A. and Lessells, W. J. **The NAAS/NIAB cereal variety trials, 1955-57 : second report.** 1959, pp. 10, Harpenden, Herts, mimeo. [Rothamsted Exp. Sta., Harpenden, Herts]

Variance between sites, between regions and between years was analysed for the 1955–7 cereal variety trials. The main source of error lay in between-site and between-year variation. The value of including a series of N treatments in variety trials is discussed. It is shown that in a 3-yr. series of trials, designed to give general recommendations for the whole country, there will be little gain in accuracy from including the results of more than 10–15 trials per year.—A.M.H.

## LEGUMES

### SOYABEANS

*See also Abs. 1193, 1331, 1332, 1483, 1562.*

1292 Lovely, W. G. and others. **Effectiveness of the rotary hoe for weed control in soybeans.** *Agron. J.* 1958, **50**, No. 10, 621–5, bibl. 14, illus. [Iowa Agric. Exp. Sta., Ames]

Inoculated soyabeans of the variety Hawkeye were sown in 1956 and 1957, (a) in rows 40 in. apart at the rate of 1 bu./ac. and (b) in rows 7 in. apart at the rate of 2·5 bu./ac. Natural weed infestations, consisting of *Setaria lutescens*, *Amaranthus retroflexus* and *Abutilon theophrasti*, were supplemented with sown *Setaria viridis*. A range of soil moisture conditions at the time of rotary hoeing was achieved by spray irrigation. Sprinkler irrigation was employed where necessary during the growing season. Early rotary hoeing, 3–5 days after bean emergence, repeated 5 and 10 days later, consistently reduced annual weed infestations by 70–80% in both plots (a) and (b) and resulted in bean yields which approached or equalled those from hand-weeded plots ; stands were reduced by 9–10% by rotary hoeing. Late rotary hoeing (delayed until weeds emerged) gave less control of weeds, and the increase in bean yield (compared with unhoed plots) was only half that obtained by early hoeing. Moderately wet soil conditions during or closely following rotary hoeing reduced the effectiveness of the treatment ; this was partially offset in some of the (a) plots by the weed control achieved by cultivating at 2·5 and 4·5 weeks after emergence. The heaviest weed growth caused a slight delay in soyabean maturity, and increased lodging by 10–15%. Closely-sown soyabeans could be grown profitably only when rotary hoeing was carried out at the correct time. In the heavy weed infestation of 1956, weed yields in (a) plots were reduced by 100–200 lb./ac., and bean yields approximated to those of hand-weeded plots under the following treatments : 3 early rotary hoeings and 2 cultivations ; 3 early hoeings and 4 lb. CDAA/ac. ; 2 late rotary hoeings and 4 lb. CDAA/ac. ; 4 lb. CDAA/ac. applied before weed emergence, followed by one cultivation 4 weeks later.—R.B.

1293 Seed World. **Lindarin—a new soybean variety.** *Seed World* 1958, **83**, No. 12, 25.

Lindarin is derived from a cross between Mandarin and Lincoln. It matures 2 days earlier than Harosoy, 4 days earlier than Hawkeye, and 3 days later than Blackhawk, and has outyielded these varieties by 3, 8 and 23%, respectively. Lindarin is shorter than Harosoy or Hawkeye and the oil content of the seeds is higher. It is resistant to downy mildew and frogeye leaf spot, slightly susceptible to stem canker, and more resistant to *Phytophthora* root rot than Harosoy.—R.B.

1294 Weber, C. R. **A new soybean — it's Ford !** *Iowa Fm Sci.* 1958, **13**, No. 5, 95–6. illus.

The oil- and protein-content of the seed of Ford is similar to that of Lincoln and Clark ; it is similar in height to Lincoln, Adams and Clark, but is less susceptible to lodging. It has outyielded Adams and Lincoln by an average of 2·5 bu./ac. and matures 1 day earlier than Lincoln, 2 days earlier than Adams, and a week earlier than Clark. Ford is considered best suited for central Iowa. —R.B.

1295 Puerta, R. J. and Alonso, M. E. Amelia. Experiencias con variedades de soja (1956–7). [**Trials with soyabean varieties (1956–7).**] *An. Inst. nac. Invest. agron.* 1958, **7**, No. 3, 539–709. [Cent. Cerealicult., Madrid]

The results are given from many trials carried out in various regions of Spain to study the adaptation of soyabean varieties. From the average yields from 26 fields in 1956–7, it is concluded that, provided the environment is suitable, preference should be given to the varieties Harosoy (average yield 1688 kg./ha.), Clark (1639 kg./ha.), Hawkeye (1457 kg./ha.) and Lincoln (1312 kg./ha.). Soyabean seed should be inoculated when sown in soil lacking the suitable Rhizobia. It should be sown in rows 60–70 cm. apart at a rate of 60–90 kg./ha. (90 kg. in clay soils) at a depth of about 5 cm. (2 cm. in clay soils). Other data given include sowing dates for different regions of Spain, and oil- and protein-contents of the seed of several varieties in Spain and the USA.—E.B.O.

1296 Chorbajian, T. **Moisture equilibria in seeds.** *Diss. Abstr.* 1958, **19**, No. 3, 403. [Iowa State Coll., Ames]

The results are given of studies of the physics of moisture equilibria in soyabean seeds.—P.J.B.

1297 Johnston, A. **A note on fungicidal seed dressing of soya bean, groundnut and long bean.** *Malay. agric. J.* 1958, **41**, No. 3, 152–5, illus.

In a pot trial, treatment of soyabean- and groundnut-seeds with fungicidal dusts including agrosan GN, spergon, fernasan and flit 406, increased the germination percentages considerably. The most successful treatments resulted in increases in germination of 53% for soyabeans and 33% for groundnuts. Treatment of long bean (*Vigna sinensis*) seed gave little benefit.—E.B.O.

1298 Sun, C. N. **Zonation and differentiation of tissues in the primary root of soyabean.** *Diss. Abstr.* 1959, **19**, No. 7, 1534–5. [Ohio State Univ., Columbus]

1299 Nagata, T. **Studies on the flowering and fruiting of summer vs. autumn soybean types. 5. Effects of the day length after flower primordia initiation upon the flowering process with reference to the adaptation to planting time in autumn soybean type.** *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 87–90, bibl. 11, Japanese summary. [Hyogo Agric. Coll.]

1300 Sasamura, S. **The effects of the photoperiod and temperature on the time of flower primordia formation and flowering and the expansion of leaves on the main stem of the late soybean variety (Ôshoku-Aki).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 83–6, bibl. 1, English summary. [Utsunomiya Univ.]

For flowering of soyabean var. Ôshoku-Aki, the critical photoperiod was 15–16 hr., but the time of expansion of main-stem leaves was not affected by photoperiods of between 10 and 16 hr. The formation of flower primordia, flowering, and the expansion of main-stem leaves proceeded more rapidly at high temperatures (26–30°C.) than at low ones (14–26°C.). F. Eng. s.—D.B.

1301 Urano, K. and others. **Effect of soil moisture content at various growing periods on growth and yield of soybean. 1. Changes of growth, flowering, fruiting, exudation and water requirement as affected by abundant and deficient soil moisture content.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 99–102, bibl. 11, English summary. [Nagano Agric. Exp. Sta.]

1302 Brown, D. M. **A phenological study of soybeans in Iowa and Ontario, Canada.** *Diss. Abstr.* 1958, **19**, No. 3, 402–3. [Iowa State Coll., Ames]

In the pre-bloom growth phase, a heat-sum index of accumulated degrees above a basal temperature of 40°F. was a less variable index of development than numbers of days and was as reliable as indices containing factors for daylength and sunshine hours, in the relatively narrow range of latitudes and degrees of cloudiness under which the trials were conducted. The length of the period from emergence to pod-initiation was affected by rainfall distribution, as well as temperatures, with the result that the heat sum was nearly as variable an index as number of days. In the final growth period, the heat-sum index was more accurate than number of days, only where the weighting for high temperatures was reduced. During the whole growth period, the heat sum was a more accurate index of the course of growth than number of days and could be used to predict the chances of a given soyabean variety of maturing in different districts. —P.J.B.

1303 Brown, J. C. and others. **Internal inactivation of iron in soybeans as affected by root growth medium.** *Soil Sci.*

1959, **87**, No. 2, 89–94, bibl. 24, illus. [U.S. Dep. Agric., Agric. Res. Serv., Beltsville, Maryland]

Using a split-root technique it was shown that Fe was inactivated in soyabeans (var. PI)—principally by the combined effects of P and Ca. Ca stimulated root growth, increased the absorption and translocation of P and Ca to the above-ground parts, but decreased the absorption and translocation of Fe in the presence of P. A varietal difference in susceptibility to induced Fe deficiency was observed ; Hawkeye soyabeans remained green under conditions which induced Fe chlorosis in PI plants. F. s.—E.B.O.

1304 Sun, C. N. **Histological responses of soybean seedlings and morphological changes of mitochondria following treatment with triethylamine 2,4,5-trichlorophenoxy-acetate.** *Bull. Torrey bot. Cl.* 1958, **85**, No. 6, 476–82, bibl. 9, illus.

## GROUNDNUTS

*See also Abs. 1331, 1575, 1583, 1584, 1631.*

1305 Merwe, J. J. van der. **Groundnut cultivation. Results of experiments useful to farmers.** *Fmg in S. Afr.* 1959, **34**, No. 12, 52–3, illus. [Towoomba Res. Sta.]

Recommendations for groundnut cultivation on the Springbok Flats and in N. Transvaal are : thorough loosening of the soil immediately after the previous crop has been harvested and shallow-tine cultivation in the spring ; applying 300–400 lb. superphosphate/morgen [1 morgen = 2·1165 ac.] at sowing, with 200 lb. ammonium sulphate/morgen on N-deficient soils and lime on soils of pH less than 5 ; sowing between the last week in Oct. and the first week in Dec. ; spacing at 3ft. × 3in. in preference to wider spacings.—A.M.H.

1306 Fourrier, P. and Prevot, P. Influence sur l'arachide de la pluviosité, de la fumure minérale et du trempage des graines. [**Influence on groundnuts of rainfall, chemical manuring and steeping the seeds.**] *Oléagineux* 1958, **13**, No. 11, 805–9, bibl. 2, English summary.

In a factorial trial at Louga, Senegal (average annual rainfall 400 mm.), the effect on yield of groundnuts of the following treatments was tested : (a) rainfall : 407 mm., 242 mm. (obtained by covering the plots from the 35th to 60th day from sowing), 312 mm. (no rainfall from the 60th to the 85th day) and 340 mm. (no rainfall from the 85th to the 110th day) ; (b) dressing with 75 kg. ammonium sulphate and 40 kg. bicalcium phosphate, per ha. ; (c) steeping the seeds in a $N/10$ solution of $CaCl_2$ for 2 hr. followed by sun-drying for 6 hr. The principal results obtained were : (a) where no fertilizer was applied, a reduction in rainfall had a depressing effect on yields only when it took place between the 35th and 60th days, and the 60th and 85th days ; (b) the application of fertilizer increased yields in the plots receiving 407 mm. of rainfall over those of the corresponding plots with no fertilizer, it compensated for the reduction in rainfall in the plots where this was nullified between the 35th and 60th days and the 60th and 85th days (yields being comparable with those in the plots with 407 mm. of rainfall and no fertilizer), and had no effect in the plots where rainfall was interrupted between the 85th and 110th days ; (c) steeping the seed had a depressing effect on yields in most cases.—E.B.O.

1307 Shear, G. M. and Miller, L. I. **Influence of time of planting and digging on the Jumbo Runner peanut.** *Agron. J.* 1959, **51**, No. 1, 30–2, bibl. 8. [Virginia Agric. Exp. Sta., Blacksburg]

Groundnuts, sown in late April or early May, required a longer growth period to reach maximum levels of shelling % and % extra large seed than did those sown in late May. For Jumbo Runner groundnuts sown on 22 May, the minimum growth period required for such levels to be reached was 148 days. Maximum yield was reached before maximum shelling % or % extra large seeds. In groundnuts sown on 22 April, the maximum level of extra large seed was reached before maximum shelling %. The earliest date for optimum maturity of this variety was 15 Oct., regardless of sowing date. Seasonal variations in temperature and rainfall had a marked effect on yield and quality, both being favoured by high temperature and moderately low rainfall. F. s.—A.M.H.

1308 Division of Agricultural Production, Department of Primary Industry, Australia. **Report on a field storage and drying system for the Australian peanut industry.** 1958, pp. 27, illus., Canberra : Department of Primary Industry.

The present methods used for the harvesting and natural drying of groundnuts in Australia are dealt with. A rack system of field storage and drying is discussed, which allows safe bagging of nuts of high moisture contents, so permitting threshing a few days after pulling and windrowing. Groundnuts in large, open-weave loosely filled bags are stacked on a wire-mesh rack of triangular cross-section. The rack is provided with a roll-up cover for weather protection. For the best drying results the rack should lie at right angles to the prevailing drying winds and parallel with the moisture-bearing winds. The rack can also be adapted for the artificial drying of groundnuts. F. s.—A.M.H.

1309 Horst, K. ter. Onkruidbestrijding bij peulvruchten. **Weed control in legumin-**

**ous crops.** *Surinaam. Landb.* 1958, **6**, No. 2, 65–71, bibl. 4. [LandbProefst. Paramaribo]

Groundnuts were given pre-emergence applications of 12·5, 15 and 20 l. Dow premerge/ha. in 800 l. water. Weeds appeared in the control plots one week after sowing, while all treated plots remained free from weeds, except for a few *Caladium bicolor* and *Cyperus rotundus* plants. In a further trial, groundnuts, var. Matjan, spaced 20 × 20, 20 × 30 and 20 × 40 cm. apart, were treated 1 day after sowing with Dow premerge at 12·5 l./ha., with and without hoeing. One week later the crop had almost completely emerged, but was somewhat yellowed where sprayed. At 11 days after sowing, weed seedlings were visible on untreated plots, only. There was a significant difference (1% level) in yield between groundnuts spaced 20 × 40 cm. apart and those more closely spaced. Yields from sprayed plots did not differ significantly from unsprayed hoed plots. Spraying was considerably cheaper than hand-weeding.—R.B.

1310 Gorter, G. J. M. A. and Krüger, W. **The effect of seed protectants on emergence of groundnuts.** *S. Afr. J. agric. Sci.* 1958, **1**, No. 3, 305–13, bibl. 13, French and Afrikaans summaries. [Coll. Agric., Potchefstroom]

In field trials in 1952–7, 38 seed dressings were tested for their effectiveness against pre-emergence losses in groundnuts. The best results were obtained with preparations based on thiram (TMTD) and with bioquin 1 (a Cu derivative of 8-quinolinol). Spergon and the organic Hg compounds were generally less effective, but cerenox special (the best organic Hg compound) was as good as thiram. Inorganic Cu compounds were of less value. With all the preparations used, an application of 1 g. per lb. of seed was more effective than half this rate. The effect of the seed dressings depended on the quality of the seed and the conditions at sowing. F.s.—A.M.H.

1311 Wyatt, R. E. **Botany and plant pathology section. Groundnut pathology.** *Rep. Dep. Agric. N. Nigeria Pt 2 1956–7*, [n.d.], pp. 126–9. [Received Feb., 1959]

Spraying with cuprous oxide or dispersible sulphur against *Cercospora* leaf spot significantly increased yield of Samaru 38 and Spanish 205 groundnuts, but had no effect on yield of Mwitunde.—A.M.H.

1312 Amaro, J. P. P. Meios de luta contra "*Pachymerus acaciae*" Gyll. Ensaios com pós insecticidas. [**Measures for controlling *Pachymerus acaciae*. Trials with insecticidal dusts.**] *CCTA/CSA Comm. 6 Sess.* 1956, **4**, 23–34, bibl. 14, English and French summaries. [Received Nov., 1958]

To control the weevil *P. acaciae* in stored groundnuts, the most economical and effective treatment recommended is to mix the groundnuts with lindane dust, 1 or 1·5% γ isomer, at a dose of 15 ppm., corresponding to 1·5 and 1 kg. of insecticidal dust per ton which gave 99 and 98% mortality, respectively. [See also *Fld Crop Abstr.* 10 : 577.]—E.B.O.

1313 Sivadjian, J. La transpiration et l'appareil stomatique des feuilles de l'arachide. [**Transpiration and the stomatal apparatus of groundnut leaves.**] *Oléagineux* 1959, **14**, No. 2, 107–9, bibl. 10, illus. [Inst. Pasteur, Paris]

Results from this investigation with the groundnut varieties Rose de Niangoloko from Upper Volta and 28 206 from Senegal showed that in leaves of adult plants transpiration was more abundant and the number of stomata higher, but their size smaller, in the upper surface than in the lower surface ; in full sunshine, transpiration was reduced because of partial closure of stomata, while the leaflets straightened up and drew closer together. Young leaves behaved differently as, in full sunshine, they showed no movement and transpired equally from each surface.—E.B.O.

1314 Bolhuis, G. G. **Observations on the flowering and fructification of the groundnut, *Arachis hypogaea*. 3.** *Neth. J. agric. Sci.* 1959, **7**, No. 1, 51–4, bibl. 3. [Lab. Trop. Agric., Wageningen]

Removal of flowers from Schwarz 21 groundnuts caused a marked increase and a marked periodicity in the intensity of flowering. Treated plants began to show a difference in flowering pattern after 10 days. In normal plants, 7–8 days elapsed between flowering and fruiting. It is suggested that inhibition of flowering occurs in normal groundnut plants before fruiting begins, possibly as early as at fertilization. [See Abs. 730.] —R.B.

1315 Mizuno, S. **Fruiting behaviour of the peanut in relation to length of day.** [Japanese] *Sci. Rep. Hyogo Univ. Agric.* 1957, **3**, No. 1, 14–16, bibl. 9, illus., English summary.

Groups of groundnut (*Arachis hypogaea*) plants were given 8-, 11-, and 14-hr. photoperiods from 10 July (10 days after beginning to flower) to harvest. The results indicated that photoperiods of 8- and 11-hr. hastened elongation of the gynophore and favoured the development of 4 mature seeds from 4-ovuled ovaries. F. Eng. s.—D.B.

1316 Niclaes, J. and Demol, J. La floraison de l'arachide dans les conditions climatiques de Bambesa. [**Flowering of groundnuts under the climatic conditions of Bambesa (Belgian Congo).**] *Bull. agric. Congo belge* 1958, **49**, No. 6, 1501–12, bibl. 3, Flemish summary.

Flowering in an early, erect variety of groundnuts at Bambesa begins about 25 days after sowing and consists of 4 phases : (a) once flowering has begun the number of flowers increases rapidly, reaching a maximum of about 4 flowers per plant in 7–9 days ; (b) the number of flowers per plant decreases regularly in the following 4–5 days ; (c) the number of flowers per plant (about 3) remains constant during 12 days ; (d) after about 48–50 days from sowing, flowering decreases rapidly. Groundnuts did not flower abundantly until 3 days after a day on which the temperature was not less than 28°C. and there were at least 4 hr. of sunshine. —E.B.O.

1317 Ilyina, A. I. Étude des périodes de haute sensibilité de l'arachide aux différences d'humidité du sol. [**Study of the periods of high susceptibility of groundnuts to different soil moisture conditions.**] *Oléagineux* 1959, **14**, No. 2, 89–92, bibl. 11, illus. [Inst. Rech. Sci. Pl. Oléag., Krasnodar, USSR]

Groundnut plants of the variety ADYG, grown under different conditions of soil moisture, were less susceptible to them during the period from germination to the formation of the flower organs than thereafter. The yield of plants grown at 80% moisture during the whole vegetative period was in fact equal to that of plants grown at 35% moisture until the beginning of pollen formation and at 80% thereafter, pod weight being 100 and 106% of that of the control, respectively. Information is also given on the anatomical changes caused in groundnut leaves by changes in soil moisture conditions.—E.B.O.

1318 Watson, K. A. **Agronomy section. Experiments report. Groundnuts.** *Rep. Dep. Agric. N. Nigeria Pt 2 1956–7*, [n.d.], pp. 5–22. [Received Feb., 1959]

The results of fertilizer trials with N and P at a number of centres are given. There were significant responses to ammonium sulphate in 2 trials, but it is not known whether the response was to N or S. Residual responses of groundnuts to superphosphate, f.y.m. and night-soil compost, applied to guinea corn or millet in the preceding year, were also demonstrated. At Samaru, the optimum spacing for groundnuts grown on the flat was 12 × 6 in.—A.M.H.

## PEAS

1319 Vittum, M. T. and others. **Effect of variable row spacings and plant populations on peas grown for processing and on the subsequent crop of alfalfa.** *Agron. J.* 1958, **50**, No. 10, 577–80, bibl. 6. [Dep. Vegetable Crops, New York State Agric. Exp. Sta., Geneva]

Peas, var. Perfection, were sown as a cover-crop for lucerne as follows : (a) in 7-in. rows at 3·61 bu./ac., (b) in 14-in. rows at 1·81 bu./ac., (c) in alternate 7- and 14-in. rows at 2·41 bu./ac., and (d) in 7-in. rows at 2·54 bu./ac. Plant populations and yields per ac. and yield per bu. of seed, respectively, were : (a) 337,000 plants, 4130 lb./ac., 1140 lb./bu. ; (b) 170,000 plants, 2960 lb./ac., 1640 lb./bu. ; (c) 222,000 plants, 3430 lb./ac., 1420 lb./bu. ; (d) 250,000 plants, 3790 lb./ac., 1490 lb./bu. The maximum yield per plant was not attained, even at the lowest seed rate. Treatment (b) produced a significantly smaller percentage of large seeds and a significantly greater percentage of small seeds than did treatment (a) or (c). None of the treatments had any effect on the percentage of medium-sized seeds. The increase in production per plant occurring at the lower seed rates did not compensate for the decrease in the number of plants per ac., despite the high cost of seed.—R.B.

1320 Pearce, G. A. **Weed research. 1. Weed control in peas.** *J. Dep. Agric. W. Aust.* 1959, **8**, No. 1, 21–3, illus.

In herbicide trials on the canning pea variety Canners 75 and on Dunn's field peas, all treatments severely affected growth of Canners 75 ; 24 oz. dinoseb in 60 gal. water/ac. was the only treatment which did not damage the field peas. The recommended weed control programme is : (a) spraying with 4 oz. a.e. MCPA or 2,4-D amine + 0·5 gal. 16% dinoseb/ac. 2–3 days before the peas emerge ; (b) spraying with 1 gal. 16% dinoseb in 50 gal. water/ac. when field peas intended for harvesting are 4–8 in. high.—A.M.H.

1321 Hicks, F. W. **Weed control investigations.** *Rep. Dep. Agric. Tasmania* 1957–8, Hobart, 1959, 39–40.

Dinoseb (amine and ammonium salt) at 1 lb./ac. and MCPB at 1·5 lb./ac. were sprayed on blue, maple and canning peas (var. Cooper's 75). Dinoseb controlled chickweed [*Stellaria media*], wild radish [*Raphanus raphanistrum*], fat hen [*Chenopodium album*], speedwell [*Veronica* sp.] and docks [*Rumex* sp.] (temporary control), but not wireweed [*Polygonum aviculare*] and spurrey [*Spergula arvensis*]. The ammonium salt of dinoseb gave slightly better weed control than the amine form, but damaged the crop more. MCPB controlled docks, wild radish, fat hen and groundsel, but only checked wireweed. Spurrey, chickweed and speedwell were not affected. It severely stunted blue peas, but did not affect maple or canning peas. MCPA (1 lb./ac.) and MCPB (2 lb./ac.) caused slight leaf crinkle in 8 potato varieties, but did not affect haulm growth. Tubers from treated plants of Brownells, Ajax and King Edward Early and Late were slightly more coloured around the

eyes than those from controls. Dalapon at 12·5 lb./ac. caused a severe check in growth of all 8 varieties. The tubers were smaller, lacking in colour and some had a leathery, dry skin.—A.M.H.

1322 Lambert, R. G. and Linck, A. J. **Effects of high temperature on yield of peas.** *Pl. Physiol.* 1958, **33**, No. 5, 347–50, bibl. 14. [Dep. Pl. Path. and Bot., Univ. Minnesota, St. Paul]

Exposure of Alaska pea plants to high temperatures for various lengths of time during a period from 5 days before full bloom to 15 days after full bloom, reduced fresh weight and the number of peas of canning size. Exposure to 32°C. (90°F.) reduced yield more than exposure to 29°C. (85°F.) and exposure to 29°C. more than to 27°C. (80°F.). Exposure to high temperature for a 6-hr. period in the middle of the 12-hr. light period on each of 5 consecutive days reduced yield more than exposure on 3 days, which in turn had a greater effect than a single exposure. Plants treated at 5 days after full bloom were most severely affected by high temperature. F. s.—A.M.H.

1323 Karr, E. J. and others. **The effect of short periods of high temperature during day and night periods on pea yields.** *Amer. J. Bot.* 1959, **46**, No. 2, 91–3, bibl. 6. [Ohio State Univ., Columbus]

Peas, var. Alaska, grown in a growth chamber under 12-hr. photoperiod, were exposed to high day- (32°C.) and/or high night-temperatures (30°C.) for periods of 3–4 days at different growth stages after the lowest flowering node was in full bloom. High day-temperatures caused the greatest yield reduction (8%) when applied 9–11 days after full bloom, and high night-temperatures the greatest reduction (25%) when applied 6–9 days after full bloom ; the heat-sensitive period was well-defined. The effect of combined high day- and night-temperature was approximately additive. F. s.—R.B.

1324 Monselise, S. P. and Went, F. W. **Effects of temperature on growth and dry matter accumulation of peas.** *Pl. Physiol.* 1958, **33**, No. 5, 372–4, bibl. 5. [Earhart Pl. Res. Lab.]

Dry-matter accumulation and elongation of Unica pea plants, grown under 4 combinations of day and night temperatures (10/10°C., 10/20°C., 20/10°C., 20/20°C.), were studied. Elongation was greatest under high day-temperatures, even if this entailed a lower total of degree-hours per daily cycle. Dry-matter accumulation was highest under 10/10°C. and lowest under 10/20°C.; leaf chlorosis was pronounced under the latter treatment. Growth of roots was best under 10/10°C. and therefore the top/root ratio was lowest at this temperature combination. Curves of relative growth rate and net assimilation rate showed initial negative values in the treatments with 20°C. night temperature, and a decline in the later stages in the treatments with 10°C. day temperature. F. s.—A.M.H.

## BEANS

*See also Abs. 1331, 1562, 1613, 1631.*

1325† Tourneur, M. L'ambérique et le mungo ne sont pas des *Phaseolus*. [" **Ambérique " and mung are not *Phaseolus* spp.**] *Riz et Rizicult.* 1958, **4**, No. 4, 131–48, bibl. 34, illus., English and Spanish summaries. [Cent. Tech. Agric. Trop., Nogent-sur-Marne, France]

As a result of investigations in which seeds from many countries were sown in heated glasshouses and the botanical characters of the plants observed, it is concluded that the plant called ambérique in Madagascar and the Mascarenhas Islands, dâu xanh in Cambodia and Annam, and mung or green gram in India, are not *Phaseolus* spp. They are considered to belong to one species, *Vigna mungo*. This is in accordance with F. N. Hepper [see *Herb. Abstr.* 26 : 1324]. Information is given on the chemical composition of the seeds and the uses of these legumes (for human consumption, green manure and fodder) in various countries.—E.B.O.

## VELVET BEANS

1326 Mes, Margaretha G. **The influence of night temperature and day length on the growth, nodulation, nitrogen assimilation and flowering of *Stizolobium deeringianum* (velvet bean).** *S. Afr. J. Sci.* 1959, **55**, No. 2, 35–9, bibl. 5. [Pl. Physiol. Res. Inst., Univ. Pretoria]

*S. deeringianum* plants were grown in N-free growth media at night temperatures of 10–27°C. and daylengths of 8·5–16 hr. An increase in the night temperature generally increased the dry weight, the % N and therefore the total N content of the plants. The higher night temperatures increased the number of nodules per plant, but reduced the average dry weight of individual nodules. These smaller nodules assimilated more N per mg. dry weight of nodule than did the large nodules formed at lower night temperatures. The depressing effect of low night temperature on growth was reduced by the addition of N to the medium and therefore appeared to be due to N starvation resulting from decreased activity of the rhizobia, rather than to a direct effect of temperature on the growth of the plants. Under the conditions of the experiment, varying daylength from 12 to 16 hr. had no significant effect on flowering, nodulation or N assimilation. A night temperature of 21°C. stimulated flowering when

compared with lower or higher night temperatures. F. s.—A.M.H.

## SERRADELLA

1327† Sim, J. T. R. **Serradella—a useful crop for the winter rainfall region.** *Fmg in S. Afr.* 1959, **34**, No. 12, 33. [Coll. Agric., Stellenbosch]

The requirements for growing serradella (*Ornithopus sativus*) in the winter rainfall region of South Africa are summarized.—A.M.H.

## *GLYCINE GRACILIS*

1328† Sekizuka, S. and Yoshiyama, T. **Studies of native fodder grasses in Japan. 3. Difference of some characteristics of native wild *Glycine* strains under several different sowing times.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 109–10, bibl. 6, English summary. [Kanto-Tosan Agric. Exp. Sta.]

Wild strains of *Glycine gracilis*, which had been gathered from various parts of Japan and improved by selection, were sown monthly from April to August. Since all strains were capable of autumn vegetative growth (some more than others), they were suitable as autumn forage crops. The strains are widely distributed in Japan from Tohoku to Kyushu. The flowering of some strains is delayed in the south. *G. gracilis* may be sown from April to June if it is to be used as a soilage crop. F. Eng. s.—D.B.

## VETCH

1329† Pate, J. S. **Nodulation studies in legumes. 2. The influence of various environmental factors on symbiotic expression in the vetch (*Vicia sativa* L.) and other legumes.** *Aust. J. biol. Sci.* 1958, **11**, No. 4, 496–515, bibl. 19. [Queen's Univ., Belfast, N. Ire.]

The major sequences of symbiosis in field-grown vetch plants (*Vicia sativa*) were similar to those described for the field pea (*Pisum arvense*) [see *Fld Crop Abstr.* 12 : 191]. In both spp. symbiotic development was characteristically synchronized with host-plant leaf-production and N-accumulation. A generalized scheme for the symbiosis and N economy of the annual legume was derived from nodulation studies carried out in Australia and Northern Ireland. Symbiotic expression of vetch as a winter annual was essentially similar to that of the same plant grown as a summer annual. There was no evidence of impairment of nodule growth or efficiency, or curtailment of nodule life span, in vetch plants overwintering in Northern Ireland. Flowering induced marked decreases in nodule number and total nodule weight in the annual legume. Nodule losses in vetch were temporarily arrested by regular removal of flower buds. Continued root growth in plants with an artificially extended vegetative phase permitted development of more nodules on minor roots than on similarly aged flowering plants. The significance of this flowering factor in annual legume symbiosis is discussed. Qualitative studies of the seasonal nodulation of various Irish legumes showed successful overwintering of nodules as a common event in all winter annual, biennial and perennial spp. The nodulation sequences of all legume spp. studied were determined largely by changes associated with the development of the host plant, e.g. periods of root expansion and rapid plant growth, the onset and completion of reproductive phases of the life cycle, etc. Examples are described where climatic and biotic effects are superimposed on this inherent symbiotic pattern of the legume. F. s.—A.M.H.

## *CENTROSEMA* SP.

1330† Barjac, H. de. La symbiose rhizobienne sur *Centrosema* du Dahomey. [***Rhizobium* symbiosis on *Centrosema* sp. in Dahomey (W. Africa).**] *Oléagineux* 1959, **14**, No. 1, 11–15, bibl. 5, illus. [Inst. Pasteur, Paris]

In the pot trials described, seeds of *Centrosema* sp. were inoculated with a *Rhizobium* strain isolated from the nodules of a *Centrosema* sp. The plants from the inoculated seed were taller, more vigorous, had a higher dry-matter content (about double) and a higher percentage of N than the controls.—E.B.O.

## LEGUMES — GENERAL

1331† Bonnier, C. and Seeger, J. Symbiose *Rhizobium* – légumineuses en région équatoriale (Deuxième communication). [**Legume/Rhizobia symbiosis in equatorial regions (second communication).**] *Sér. sci. 76 INÉAC* 1958, pp. 66, bibl. 22, illus. [Inst. Agron. État, Gembloux, Belgium]

During a visit to Yangambi, Belgian Congo, in 1957, observations were made on inoculated cultivated legumes, some of which had been studied previously [see *Fld Crop Abstr.* 11 : 1106]. Results confirmed the great advantage from inoculation, particularly in the case of soyabeans, groundnuts, *Phaseolus angularis*, *Mucuna pruriens* var. *utilis* and *Canavalia ensiformis*, all of which were tested under field conditions.—E.B.O.

1332† Allos, H. F. and Bartholomew, W. V. **Replacement of symbiotic fixation by available nitrogen.** *Soil Sci.* 1959, **87**, No. 2, 61–6, bibl. 8. [Iowa Agric. Exp. Sta., Ames]

The influence of increasing amounts of available inorganic N on symbiotic N fixation was studied with legumes grown in gravel culture in a glasshouse and supplied at weekly intervals with tracer N. Subsequent analyses of the plants permitted calculation of the N derived from the fertilizer and that from fixation. All the legumes responded, in growth and in N uptake, to the addition of inorganic N ; in some instances the increases in growth resulting from the fertilizer caused increases in N fixation. When the applied N exceeded that necessary for the growth increase, it tended to replace that from the fixation process. Total N fixation was closely related to the amount of growth. Soyabeans fixed a higher amount of N, and had a higher total dry-weight production than the other legumes tested. Fixation processes never supplied sufficient N for maximum growth. Each species tested was apparently capable of supplying, by fixation, only about one-half to three-fourths of the total N which could be used by the plant. F. s.—E.B.O.

1333† Bingefors, S. Råproteinhalten hos trindsäd i försök vid Sveriges Utsädesförening. **Content of crude protein in legumes in trials of the Swedish Seed Association.** *Sverig. Utsädesfören. Tidskr.* 1958, **48**, No. 6, 287–95, bibl. 3, English summary.

The results are given of determination of the crude-protein content of pulse crop seeds grown at different Branch Stations of the Swedish Seed Association. In 7 trials, the respective mean crude-protein contents of Hero peas, High-bred vetch [*Vicia* sp.] and Primus horse beans [*Vicia faba*] were 28·5, 35·5 and 30·5%. Mean crude-protein yields were 734, 690 and 900 kg./ha., respectively. Data are given of the crude-protein contents of a number of yellow and green culinary peas and fodder peas, of the vetch varieties High-bred, Stjärn, U02281 and Östgöta Små and the horse bean varieties Primus and Pirhonen. The crude-protein content of peas grown at Ultuna during 1940–54 ranged from 24·8% in 1943 to 30·5% in 1941 ; there did not appear to be any clear correlation between yield and protein content.—P.J.B.

## ROOT CROPS

### SUGAR-BEET

*See also Abs. 1582, 1613, 1632.*

1334 Ballatore, G. P. and Terregino, S. Esperienze sulle modalità di semina della barbabietola da zucchero. [**Trials on sowing methods for sugar-beet.**] *Sicilia agric. forest.* 1957, No. 9–10, 230–45, bibl. 6, illus., English summary. [Received Jan., 1959]

In trials at Ricalcata, near Trapani, Sicily, on clay soil, in 1954–6, sowing in ridges gave significant increases in yield, compared with sowing on the flat, for the highest yielding varieties, Kleinwanzleben AA, Kleinwanzleben E and Dippe E only. [See also *Fld Crop Abstr.* 11 : 210.]—E.B.O.

1335 Fischnich, O. and Thielebein, M. Entwicklungstendenzen im Zuckerrübenbau. Saatgut, Aussaat, Pflege. [**Trends in sugar-beet cultivation.**] *Landbauforschung* 1958, **8**, No. 1, 7–9, bibl. 9, illus. [Inst. PflBau u. Saatguterzeugung, Braunschweig-Völkenrode, W. Germany]

An outline is given of sowing, weeding and singling operations as they relate to the use of different forms of beet seed, e.g. seed clusters, segmented seed, and monogerm seed. With economy of labour in mind, the present tendency is to use monogerm seed (whether segmented and polished, segmented and pelleted, or genetically monogerm), sown at 4–8 kg./ha. with a single-grain drill. This is followed by chemical control of weeds, before emergence of the sugar-beet, mechanical singling and a final hoeing or herbicidal treatment.—D.B.

1336 Culpin, C. **Mechanization of sugar beet growing.** *Agriculture, Lond.* 1958, **65**, No. 9, 430–5.

The latest developments in seed-bed preparation, drilling, singling, mechanical thinning, inter-row hoeing, and harvesting of sugar-beet are surveyed.—A.M.H.

1337 Zanini, E. and Ballatore, G. P. Prospettive agronomiche ed economiche della bieticoltura nell'Italia peninsulare. [**Agronomic and economic prospects for sugar-beet growing in central-southern Italy and the Italian Islands.**] *Atti 3° Conv. ann. Soc. ital. Genet. agr.* [Cont. in] *Genet. agr.* 1957, **8**, No. 1–4, 55–62. [Received Jan., 1959]

The best sowing period for sugar-beet is 15 Oct.–15 Nov. in southern Italy, and November in the Islands. The density should be 8–10 plants per sq. m. In trials in Sicily, the varieties Pedigrée E and Klein 2, both of which had 4–10% bolters, yielded considerably more roots and sugar than Klein AA, which, however, did not bolt. Under suitable conditions, sugar-beet yields 4000, or more, kg. sugar/ha., in southern Italy.—E.B.O.

1338 Zanini, E. and Ballatore, G. P. Prospettive agronomiche ed economiche della bieticoltura nell'Italia peninsulare. [**Agronomic and economic prospects for sugar-beet growing in the Italian peninsula.**] *Sicilia agric. forest.* 1956, No. 8–9, pp. 7, illus. [Received Jan., 1959]

1339 Garay, O. A. and Pasquale, D. R. Posibilidades del cultivo de la remolacha azucarera en el sudeste de la provincia de Buenos Aires [**Possibilities for growing sugar-beet in the south-east of Buenos Aires province.**] *Idia* 1958, No. 127, 20–9, bibl. 5, illus. [Esta. Exp. Agropec., Balcarce, Argentina]

There are possibilities for introducing sugar-beet in the south-east of the Buenos Aires province where it could be grown without irrigation or manuring on 100,000 ha. in the rotation potatoes/sugar-beet/wheat and oats.—E.B.O.

1340 Magnani, M. La bietola a semina autunnale. [**Autumn-sown sugar-beet.**] *Atti 3° Conv. ann. Soc. ital. Genet. agr.* [Cont. in] *Genet. agr.* 1957, **8**, No. 1–4, 77–81. [Received Jan., 1959]

The new, non-bolting sugar-beet variety Cesena NSA is suitable for southern Italy, where it is sown in autumn and harvested in the following summer.—E.B.O.

1341 Porcelli, S. Aspetti agronomici della bietola da zucchero a semina autunnale in Puglia e Lucania. [**Agronomical aspects of sugar-beet sown in autumn in Puglia and Lucania.**] *Atti 3° Conv. ann. Soc. ital. Genet. agr.* [Cont. in] *Genet. agr.* 1957, **8**, No. 1–4, 82–128, bibl. 42, illus. [Received Jan., 1959]

The sugar-beet varieties Klein AA and Rovigo AU gave the least percentages of bolters. —E.B.O.

1342 Detroux, L. and Wauthy, R. Essais de désherbage sélectif des champs de betterave. [**Trials to control weeds in sugar-beet fields by selective preparations.**] *Publ. tech. Inst. belge Amélior. Better.* 1958, **26**, No. 3, 121–38, bibl. 2, illus., English and Flemish summaries.

Results are given from 2 plot trials carried out in Belgium, in 1956, on the chemical control of weeds in sugar-beet (sown on 4 Apr.). Most of the preparations tested were applied before sowing ; 3 were applied after emergence. All the preparations tested retarded the growth of weeds but reduced sugar-beet yields significantly, even when applied before sowing. The herbicides based on PCP, at a low dose, and on CMU, at a very low dose, gave encouraging results.—E.B.O.

1343 Steyvoort, L. van. Le blaniule moucheté, possibilités de lutte. [**Possibilities for controlling the spotted millipede (*Blaniulus guttulatus*).**] *Publ. tech. Inst. belge Amélior. Better.* 1958, **26**, No. 2, 73–84, illus., English and Flemish summaries. [Inst. Betterave, Tirlemont, Belgium]

The damage caused to sugar-beet crops by *Blaniulus guttulatus* has increased in Belgium during the past few years. This millipede is injurious to seeds during germination and to the root hairs of seedlings. Results from a trial to control this pest in 1958 showed that : (a) in infested areas, top-dressing the soil, immediately before sowing, with 10–20 kg. of lindane or aldrin, 7·5 and 25% a.m./ha., respectively, or dusting the seed with 43.10a-Bayer at 4 and 6% ensured normal plant emergence ; (b) dusting the seed with lindane or aldrin, although less effective than the previous treatments, gave a satisfactory plant density. As the populations of *B. guttulatus* were not reduced by these treatments, the protection given by them is attributed to a repellent action.—E.B.O.

1344 Ernould, L. and Steyvoort, L. van. La végétation, les ennemis et les maladies de la betterave en Belgique, en 1957. [**Development, pests and diseases of sugar-beet in Belgium in 1957.**] *Publ. tech. Inst. belge Amélior. Better.* 1958, **26**, No. 2, 33–72, English and Flemish summaries. [Inst. Betterave, Tirlemont]

1345 Kristensen, H. R. and Christensen, M. Virusgulsot hos bederoer. **1. Sugar beet yellows. 1.** *Tidsskr. Planteavl* 1958, **62**, No. 3, 369–419, bibl. 49, illus., English summary.

A 4-year study of the spread of sugar-beet yellows in Denmark was made, with special reference to the beet clamps concerned and the number of them which contained overwintered *Myzus persicae*. The proportion of clamps containing *M. persicae* in the spring of 1954, '55 and '56 was about 10% in each year and rose to 45% in 1957 ; respective percentages of virus-infected plants in the field were 21, 23, 10·5 and 52. Beet plots experimentally inoculated with virus yellows in the middle of June yielded up to 27% less dry matter (in leaves and roots) than did the control plots ; but yields from plots inoculated in the middle of August showed little yield reduction. Spraying with 8 or 9 applications of systox or parathion considerably reduced infection and increased yield by 18–37% ; systox and meta-systox were more effective than parathion. F. s.—G.M.R.

1346 Kamra, S. K. Zur Unterscheidung von Zuckerrüben-, Zuckerfutterrüben- und Mangoldsamen im Laboratorium. [**Attempts to distinguish between seeds of sugar-beet, fodder-beet and mangel in the laboratory.**] *Landw. Forsch.* 1958, **11**, No. 3, 178–84, bibl. 14, illus., English and French summaries. [Samenprüfstelle der Landwirtschaftskammer, Münster i. Westfalen, W. Germany]

Several rapid methods were tested. Although no one method distinguished satisfactorily between varieties of *Beta vulgaris*, the three noted below contributed towards this end. 1. The percentage of seedlings with pink hypocotyls. In sugar-beet varieties, this was 60–80% (except Dieckmanns

Type N in which it was 24%). Among sugar-fodder-beet varieties, it was 98% in Ovana and 30% in Rheinische Lanker. Seed of mangel could not be identified by this test. 2. The fluorescence of roots of 14-day-old seedlings growing in narrow glass tubes (described). [Main] roots of seedlings fluoresced faintly, e.g. : sugar-beet, bluish white ; fodder-sugar-beet, blue-green ; fodder-beet, green. Lateral roots exhibited a yellow fluorescence which was definite in sugar-beet but less intense in sugar-fodder-beet. 3. Cotyledon colour. Seed of the mangel variety Lukullus could be distinguished in seedlings when 7–10 days old ; the yellow-green cotyledons were in contrast with the dark green cotyledons of other beet varieties.—D.B.

1347 Ingold, M. and Rapin, J. Résultats de germination de semences de betteraves sucrières. [**Results of germination of sugar-beet seed.**] *Rev. rom. Agric.* 1958, **14,** No. 12, 94–6, bibl. 1, illus. [Stat. Féd. Essais Agric., Lausanne, Switzerland]

Some characteristics of seed clusters of polyploid and diploid sugar-beet were compared with the following results. In polyploid types, the weight per 100 glomerules, the germination capacity and germination rate were greater, and the number of seed per cluster was lower, than in the diploid types. Diploids showed better emergence in the field ; and in both types, emergence was better on an organic than on a heavy soil. It is considered that the advantages possessed by polyploid types are not of great importance because the work of singling is not reduced to any noticeable extent.—D.B.

1348† Lakon, G. and Bulat, Helene. Die Feststellung der Keimfähigkeit der Rubensamen (*Beta vulgaris* L.) nach dem Topographischen Tetrazolium-Verfahren. [**Determination of the viability of beet seed by the topographic tetrazolium method.**] *Saatgut-Wirtsch.* 1958, **10,** No. 12, 339–40, bibl. 3, illus. [Inst. Samenkunde, Landw. Hochsch. Hohenheim, Stuttgart-Hohenheim, W. Germany]

The seeds are first soaked in water for 20–24 hr. The bracts round the seed clusters are then removed and the latter are placed in a 1% tetrazolium-preventol solution and kept in a thermostat at 30°C. for 40–48 hr. Embryos are then removed from seeds and examined. A seed is counted as viable if the whole embryo is stained red or if only the tip of the radicle and/or of cotyledons remains unstained and is therefore necrotic. The results show very good agreement with those obtained by the germination test. The method is applicable to sugar-beet, fodder-beet, beetroot and mangels.—D.B.

1349 Oshima, E. **Studies on the photosynthesis of sugar-beet plants. 1. Changes in the photosynthetic ability under field condition.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27,** No. 1, 141–2, English summary. [Hokkaido Agric. Exp. Sta.]

The photosynthetic activity of sugar-beet growing in the field was studied. Though total photosynthetic activity per plant increased with the increase in total leaf area, the rate of photosynthesis per 100 cm.$^2$ of leaf area decreased as the total leaf area increased. This is attributed to leaf shade. F. Eng. s.—D.B.

1350 Sisakjan, N. M. and others. [**Some physico-chemical properties of chloroplast proteins.**] [Russian] *Biohimija (Biochemistry, Leningr.)* 1958, **23,** No. 5, 728–36, bibl. 37, illus., English summary. [Biochem. Inst., Acad. Sci. USSR, Moscow]

A quantitative assay of the components of sugar-beet chloroplasts has shown that they comprise proteins, carbohydrates, mineral salts and ribonucleic acid. F. Eng. s.—M.H.

1351 Owen, P. C. **The effects of short periods of water stress on the growth of sugar beet in pots.** *New Phytol.* 1958, **57,** No. 3, 318–25, bibl. 12. [Levington Res. Sta., Ipswich, Suffolk]

[See also *Fld Crop Abstr.* 9 : 849.] Cultures of sugar-beet and broad beans were subjected to repeated short periods of water stress up to a maximum pF of 4·0. In some of the cultures, the leaf areas of the plants were lower than those of plants grown under conditions of minimum water stress, but there was no significant effect of water stress on dry-matter production or net assimilation rate. The loss of water per unit leaf area was not affected by the water regime, but the cumulative water loss from pot and plant over the experiments was greater under the wet regime, partly because the leaf area was greater. In pot-culture experiments, where the total amount of water within the root zone is relatively small, it is impossible to impose stress conditions above wilting point for long enough to produce detectable effects on growth. The results of water stress experiments may depend as much on the duration and timing of the periods of stress as on the level of stress imposed. F. s. —M.H.

1352 Donà dalle Rose, A. Sull'impiego dell'acido gibberellico nella pratica della produzione del semebietole e della selezione per la resistenza alla " prefioritura ". [**The use of gibberellic acid in the production of sugar-beet seed and in the selection for resistance to bolting.**] *Agricoltura d. Venezie* 1959, **13,** No. 3, 114–36, illus. [Sta. Sper. Bieticoltura, Rovigo, Italy]

In a field trial in 1958, sugar-beet plants treated with the K salt of GA (200 ppm. solution, 5 c.c. per plant per treatment, 2 treatments

supplying a total of 2 mg. per plant) matured 9–10 days earlier than the untreated controls. The plants were either treated in nurseries, before transplanting, on 24 Feb. and 3 Mar., or in the field, after transplanting, on 21 and 24 Apr.—E.B.O.

1353 Barbagallo, L. and Di Benedetto, Pina. Ricerche sulla nutrizione minerale delle barbabietole da zucchero attraverso l'analisi fogliare. Nota 1. [**Investigations on the mineral nutrition of sugar-beet by means of foliar diagnosis. Note 1.**] *Ann. Sper. agr.* 1958, **12**, No. 5, 1387–400, bibl. 38, English summary. [Sta. Sper. Granicolt. Sicilia, Catania, Italy]

Data are given of the contents of N, P and K in the leaves of some cultivars of autumn-sown sugar-beet grown in Sicily in 1955–7, at different stages of growth. The amounts of nutrients in the leaves were closely related to their availability in the soil.—E.B.O.

1354 Lüdecke, H. and Nitzsche, M. Über die Wirkung einer auf das Zuckerrübenblatt gegebenen Düngung in Form von Cyanamid und dessen Polymeren Dicyandiamid und Melamin. [**The effect of foliar manuring of sugar-beet with cyanamide and its polymers dicyandiamide and melamine.**] *Landw. Forsch.* 1958, **11**, No. 3, 167–78, bibl. 8, illus., English and French summaries. [Inst. Zuckerrübenforschung, Göttingen, W. Germany]

Dry application of any of the above materials, at approximately 0·75 cwt. N/ac., neither damaged the foliage nor depressed the yield. When sprayed onto the leaves, using 0·1% saponin as a sticker, at about the 10-leaf stage, cyanamide ($H_2CN_2$) was safe only as a 0·25% solution. Higher concentrations (0·5%, or 0·25% twice within one week) significantly depressed yields of tops and roots, and 1% or more killed the plants. Tolerance of sugar-beet to foliar applications of dicyandiamide ($(H_2CN_2)_3$) was greater : A 0·5% solution did not injure the leaves, and it increased yields compared with those obtained from a foliar top dressing of approximately 16 lb. N, as $NaNO_3$, per ac. Applied in favourable weather, especially in autumn, dicyandiamide considerably increased the per-acre yield of purified sugar, especially since the content of ash and noxious N was reduced. Melamine ($(H_2CN_2)_3$) was most favourable at the lowest (0·25%) concentration. Total yield increases here were significant, but net yields of sugar were not substantially affected. The depression of yields following higher concentrations of melamine may be due to inhibited root growth, recorded where 1·0% solutions were used. F. Eng. s.—D.B.

1355 Nix, J. S. **Labour requirements for sugar beet.** *Agriculture, Lond.* 1959, **65**, No. 11, 549–53. [Sch. Agric., Univ. Cambridge]

The labour requirements for sugar-beet production in Eastern England in 1927–57 are surveyed. The effects of mechanical thinning and harvesting on labour requirements are discussed. It is concluded that mechanical thinning and harvesting is worth-while on as little as 8–10 ac. of sugar-beet, even if yields fall by 1 ton/ac. Investment in machinery would be unprofitable only if yields fell by 3 tons/ac.—A.M.H.

1356 Barberi, B. Alcuni dati statistici sulla bieticoltura nell'Italia centrale. [**Statistical data on sugar-beet growing in central Italy.**] *Atti 3° Conv. ann. Soc. ital. Genet. agr.* [Cont. in] *Genet. agr.* 1957, **8**, No. 1–4, 316–24. [Received Jan., 1959]

1357 Sartori, G. A. Centro seme bietole. [**A centre for the production of sugar-beet seed (at Badia Polesine, Rovigo, Italy).**] *Atti 3° Conv. ann. Soc. ital. Genet. agr.* [Cont. in] *Genet. agr.* 1957, **8**, No. 1–4, 129–30. [Received Jan., 1959]

## FODDER-BEET

*See also Abs. 1204, 1346, 1582, 1586, 1613.*

1358† Bosman, J. C. De opbrengst aan droge stof van een gewas voederbieten bij verschillende oogsttijden in het najaar. [**The yield of dry matter from a fodder-beet crop at different dates of harvesting in autumn.**] *Jaarb. Inst. Biol. Scheik. Onderz. LandbGew., Wageningen* 1958, 17–19, English summary.

Fodder-beet, var. Barres, harvested on 25 November, produced slightly greater yields of dry-matter than did beet harvested on any of 11 dates between 30 September and 19 November.—R.B.

## SWEDE-TURNIPS

*See also Abs. 1613.*

1359† Prytherch, E. I. **Precision drilling swedes.** *Quart. Rev. N.A.A.S.* 1958, **10**, No. 42, 71–4. [N.A.A.S., Wales]

The importance of adequate and timely cultivation, use of graded seed, seed-dressing, spacing and weed control are discussed. The effect of precision sowing on production costs is briefly considered.—A.M.H.

## POTATOES

*See also Abs. 1483, 1552, 1558, 1586, 1640, 1641.*

1360 Llavería, B. M. and Montalvo, S. R. Peso de semilla y densidad de sembrío en la papa. [**Weight of seed tubers and seed rate for**

**potatoes.**] *Inf. mens. Esta. exp. agric., La Molina* 1958, **32**, No. 371, 1–6.

From trials in Peru over several years the principal conclusions were : (a) with the same weight of seed potatoes per ha., similar yields were obtained from planting small, medium or large tubers ; (b) small seed tubers yielded a smaller proportion of potatoes for consumption than did larger tubers ; this proportion increased directly with the size of the seed ; (c) with a normal spacing of 30 cm. between hills, satisfactory results were obtained from planting several small tubers per hill.—E.B.O.

1361 KELLER, E. R. and MÜNSTER, J. Über die Auswirkungen der Saatkartoffelsortierung auf Wachstumsverlauf und Ertragsleistung. [**The effect of seed-potato grade on growth and productivity.**] *Mitt. schweiz. Landw.* 1959, **7**, No. 1, 1–11, bibl. 11, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon, and Lausanne]

See next abstract.

1362 MÜNSTER, J. and KELLER, E. R. Examen de la valeur culturale respective des plants de pommes de terre de petit calibre et de calibre normal. [**The cultivation value of small- and normal-sized seed potatoes.**] *Rev. rom. Agric.* 1958, **14**, No. 12, 96–9, bibl. 11, illus. [Stat. Féd. Essais Agric., Zürich-Oerlikon and Lausanne, Switzerland]

Observations are recorded of emergence, vegetative development, tuber yields, tuber size (of the harvested crop) and financial returns obtained from seed potatoes, of small size (Bintje and Ackersegen, 30–35 mm.) and normal size (Bintje 35–50 mm., Ackersegen 35–55 mm.), grown in 9 locations throughout Switzerland. In each case, sprouted and unsprouted seed potatoes were planted. The larger seed-potatoes gave the better emergence, vegetative growth and tuber yield. For each variety, the best financial returns were obtained from sprouted seed-potatoes of normal size. In favourable situations (light soils in frost-free areas) sprouted seed-potatoes of small size were as productive as non-sprouted tubers of normal size. The advantage of using the small tubers is that they cost approximately half that of normal-sized tubers. In autumn 1957, the grade of small seed tubers was raised from 30–35 mm. to 32–35 mm. —D.B.

1363 DETILLEUX, E. La culture de la pomme de terre dans la région d'Elisabethville. [**Potato-growing in the Elizabethville region (Belgian Congo).**] *Bull. Inform. I.N.É.A.C.* 1958, **7**, No. 5, 323–38, bibl. 2, illus. [Sta. Exp. de Keyberg]

In this region, where temperature and humidity are high, there are possibilities for extending potato-growing, provided that suitable warehouses are constructed for storing the tubers at a low temperature (2°–4°C.). Potatoes are planted either in the second half of Jan. during the rainy season and harvested during 15–30 Apr., or else in the dry season in Aug. and harvested in early Nov. The potato crops planted in the dry season have a low incidence of disease but require sprinkler irrigation, which is expensive. In trials at the Keyberg Station, potato varieties from the Netherlands yielded better than those previously grown ; the variety Gineke yielded consistently well in 3 consecutive seasons. Information, and recommendations, are made on cultural methods, disease control and tuber storage. An estimate of costs is made for growing potatoes with or without irrigation.—E.B.O.

1364 GALL, H. Untersuchungen zur Auswertung langjähriger Sortenversuche bei Kartoffeln. [**Evaluation of long-term potato varietal trials.**] *Z. Landw. Vers. UntersuchW.* 1957, **3**, No. 4, 319–90, bibl. 31, illus., Russian, French and English summaries.

The paper gives a statistical analysis of results of potato varietal trials conducted over 7 yr. at about 30 locations in E. Germany. A combined soil-and-topography map with supplementary data shows the environmental conditions under which the trials were conducted.—D.B.

1365 FABIANI, L. Considerazioni sulle " varietà locali " di patata. [**Considerations on the " local varieties " of potato.**] *Sementi elette* 1958, **4**, No. 5, 28–31, illus.

Information is given on local varieties of potato in Italy and other countries which are worth maintaining because of their quality or earliness. —E.B.O.

1366 JOHNSTON, G. R. and others. **Huron, a new white, late-maturing variety of potato resistant to common scab.** *Amer. Potato J.* 1958, **35**, No. 10, 715–20. [Bot. and Pl. Pathol. Div., Canada Dep. Agric., Ottawa, Ontario]

A description is given of the new potato variety Huron. In field trials it showed considerable resistance to scab [*Rhizoctonia solani*] and early blight (*Alternaria solani*), and immunity to virus B. It showed necrotic intolerance to virus Y and varying degrees of susceptibility to other viruses. It was somewhat susceptible to late blight (*Phytophthora infestans*), but less so than Katahdin. It was approximately equal in cooking quality to Katahdin and Green Mountain.—R.B.

1367 JOHANSEN, R. H. **Nordak and Norgleam: two new white-skinned potato varieties with early maturity and field resistance to virus Y.** *Amer. Potato J.* 1958, **35**, No. 12, 774–7. [N. Dakota Agric. Exp. Sta., Fargo]

Nordak and Norgleam have shallow eyes and are of excellent cooking quality. Nordak matures at about the same time as Red Warba, and Norgleam at the same time as Irish Cobbler. Both varieties have short stolons. Norgleam gave higher yields than Triumph and Early Gem when harvested either in mid-August or mid-September, but outyielded Pontiac only when harvested in mid-August. Under irrigation, Nordak outyielded Triumph and Early Gem. In varietal trials in N. Dakota in 1956, Norgleam yielded 373 bu./ac. and Nordak 395 bu./ac. When harvested in August, Norgleam and Nordak produced good quality potato crisps in 1956 only after a period of storage, but in 1957 potato crisps produced from these varieties were similar to those from Irish Cobbler. —R.B.

1368 Johansen, R. H. and others. **Norland, a new red-skinned potato with early maturity and moderate resistance to common scab.** *Amer. Potato J.* 1959, **36,** No. 1, 12–15, illus. [N. Dakota Agric. Exp. Sta., Fargo]

Norland matures at about the same time as Red Warba and Waseca and is about 15 days earlier than Red Pontiac. The tubers have a smooth skin with evenly-distributed shallow eyes. Irregularly shaped or otherwise defective tubers are rare in this variety. Norland is susceptible to late blight and virus diseases. In field trials in 1955–6 it outyielded Red Pontiac and Triumph when harvested on 15 August ; it outyielded Triumph, but not Red Pontiac, when harvested on 15 September under irrigated or unirrigated conditions. Norland produces a very high proportion of No. 1 grade ware potatoes and has good cooking quality. The yield of potato crisps per unit weight of tubers is lower than from Irish Cobbler, but the crisps are lighter in colour.—R.B.

1369 Robinson, R. G. **The use of North American potato varieties in New Zealand.** *Amer. Potato J.* 1959, **36,** No. 2, 70–1. [New Zealand Seed Potato Adv. Cttee]

At present, Chippewa, Katahdin, Sebago and Dakota Red occupy 38·5% of the potato acreage in New Zealand. F. s.—R.B.

1370 Niederhauser, J. S. Eréndira, nueva variedad de papa resistente al tizón tardío. **[Eréndira, a new potato variety resistant to late blight.]** *Agricultura téc., Méx.* 1958, No. 6, 2–3 and 30, illus.

Information is given on Eréndira, 120 days, (possibly the first potato variety bred in Mexico) which is resistant to late blight (*Phytophthora infestans*). It is suitable for cultivation in the rainy season in the high valleys and the Sierra of the central plateau in Mexico and in experimental fields it has yielded 25 tons of tubers per ha.–E.B.O.

1371 Pérez, M. J. E. and Estrada, R. N. Monserrate, una nueva variedad de papa. **[Monserrate, a new potato variety.]** *Agric. trop., Bogotá* 1958, **14,** No. 11, 684–92, illus. [Cent. Nac. Invest. Agríc., Tibaitatá, Colombia]

The characteristics are given of Monserrate which, in trials in Colombia over several years, yielded up to 52,000 kg. tubers/ha.—an average of 30% more than the local varieties Tocana, Tuquerreña and Ojona. It has also the following advantages over these varieties : resistance to *Phytophthora infestans*, greater earliness, and greater uniformity in tuber size, germination and maturation. [See also Abs. 777.]—E.B.O.

1372 Idia. Dos nuevas variedades de papa. **[Two new potato varieties.]** *Idia* 1958, No. 127, 29–30, illus. [Esta. Exp. Agropec. Balcarce, Argentina]

The characteristics are given of Buena Vista and Santa Rafaela.—E.B.O.

1373 Feingold, J. H. **What varieties of potatoes should we grow ?** *E. Afr. Fmr and Planter* 1958, **3,** No. 3, 17–18, 40, illus. [Cedar Lodge Fm, Dundori, Kenya]

In trials in 1958, Voran, Professor Broekema and Profijt yielded significantly more than Dutch Robijn, which is widely grown in Kenya. The qualities and defects of 20 varieties tested are tabulated, with reference to their suitability for Kenya conditions.—A.M.H.

1374 Heiken, A. **Aberrant types in the potato.** *Acta agric. scand.* 1958, **8,** No. 3, 319–58, bibl. 102, illus. [Inst. Pl. Res. and Cold Storage, Nynäshamn, Sweden]

A systematic study of aberrant potato types is presented and the literature is reviewed.—G.M.R.

1375 Hodgson, W. A. **Spray trials with two antibiotics and an antimetabolite for potato late blight control.** *Amer. Potato J.* 1958, **35,** No. 10, 711–4, bibl. 9. [Bot. and Plant Pathol. Div., Canada Dep. Agric., Ottawa, Ontario]

Field trials were carried out with streptomycin, dihydrostreptomycin and DL-ethionine sprays in 1956 and '57, and with copper oxychloride sulphate (COCS) in 1957, on Green Mountain potatoes. In 1956 dihydrostreptomycin gave the best control of defoliation caused by *Phytophthora infestans* and the 2 antibiotics resulted in the highest yields, though differences were not significant. In 1957, dihydrostreptomycin and COCS were equally effective and were significantly better than streptomycin or DL-ethionine for controlling defoliation and increasing yield. Streptomycin-treated plots yielded significantly better than did the controls. —R.B.

1376 Smedgård, G. Undersökning rörande filts-

jukan hos potatis (*Rhizoctonia solani*) och dess utbredning i Halland. [**Investigations on black scurf (*Rhizoctonia solani*) in potatoes and its distribution in the Halland province.**] *K. Skogs LantbAkad. Tidskr.* 1958, **97**, No. 3, 171–88, bibl. 6, illus., German summary.

Studies in the Halland province of Sweden in 1955–6 showed that frequency of attack was probably not greatly influenced by soil reaction, but that humus content, the use of farmyard manure and, in particular, crop rotation, were all important. Close correlations were found between planting depth and the incidence of *R. solani* on the seed tubers on the one hand, and damage to the plants on the other, and (when soil infection was insignificant) between the incidence of *R. solani* on the seed tubers and its incidence in the harvested crop. Disinfecting seed tubers with the Hg-containing preparations aretan and aardisan was very effective in preventing damage to plants, but often resulted in some reduction of yield. F. s. —G.M.R.

1377 Revilla, V. A. and Brown, Lily. El "kasahui" de la papa en el Perú. [**"Kasahui" of potato in Peru.**] *Bol. trim. Exp. agropec., Lima* 1957, **6**, No. 4, 22–4, bibl. 1. [Esta. Exp. Agríc., La Molina, Peru] [Received Jan., 1959]

In the Sierra of Peru, mainly in the Puno Department, "kasahui" disease (*Stemphylium consortiale*) causes serious damage to potato crops. Observations so far made indicate that the fungicides for the control of *Phytophthora infestans*, e.g. perenox 0·50%, are effective against *S. consortiale*. —E.B.O.

1378 Rodríguez, R. A. "Torbó," una enfermedad de las papas que se presenta en Costa Rica. [**"Torbó", a disease of potatoes in Costa Rica.**] *Turrialba* 1958, **8**, No. 2, 55–63, bibl. 3, illus., English summary. [Minist. Agric. Industr., San José, Costa Rica]

Field trials were carried out in the northern part of Cartago, Costa Rica, to control with fungicides "torbó" disease (probably *Rosellinia* sp.) which affects the aerial part and the tubers of potatoes. Terrachlor at 250 kg./ha. and vapam at 100 l./ha., each applied twice at a 3-week interval, gave significant control of the disease under dry conditions, but were not as effective in wet weather. —E.B.O.

1379 Maskell, F. E. **Aldrin and *gamma*-BHC for the control of wireworm [*Agriotes* spp.] damage to potatoes.** *Pl. Path.* 1958, **7**, No. 3, 98–100, bibl. 4. [N.A.A.S. E. Reg., Trumpington, Cambridge]

Aldrin dust or spray (2·1 and 2·25 lb. aldrin/ac. respectively) and *gamma* BHC dust or spray (0·76 and 0·75 lb. *gamma* BHC/ac. respectively) gave significant reductions in the numbers of damaged potato tubers. There were no significant differences between aldrin and *gamma* BHC or between dust and spray treatments. No off-flavour was reported for aldrin-treated tubers.—D.B.

1380 Simon, J. E. and Llavería, M. Los insecticidas orgánicos en el control del gorgojo de los Andes. [**Organic insecticides for controlling potato weevils (in Peru).**] *Inf. mens. Esta. exp. agric., La Molina* 1958, **32**, No. 370, 10–17, bibl. 3.

In trials on the control of the weevils *Premnotrypes solani*, *Trypopremnon latithorax*, *T. sanfordi* and *Rhigopsidius tucumanus*, the most effective treatment (up to 100% healthy tubers) was aldrin spray 0·5% a.m. applied to the potato foliage at 500 l./ha.—E.B.O.

1381 Orlando A. and Fadigas, M. Principais pragas da batatinha (*Solanum tuberosum* L.). Recomendações para o contrôle. [**Principal pests of potato (*S. tuberosum*). Recommendations for their control.**] *Biológico, S. Paulo* 1958, **24**, No. 11, 215–30, bibl. 20, illus.

Recommendations are made for the control of *Epicauta atomaria*, *Dyscinetus* sp., *Laphygma frugiperda*, *Agrotis ypsilon*, *Gnorimoschema operculella*, *Pseudococcus maritimus*, *Maecolaspis prasina*, *Myzus persicae*, *Macrosiphum solanifolii* and *Solenopsis saevissima* which attack potatoes in São Paulo, Brazil.—E.B.O.

1382 Hoyman, W. G. **Effect of thimet on incidence of virus Y and purple-top wilt in potatoes.** *Amer. Potato J.* 1958, **35**, No. 10, 708–10, bibl. 1. [U.S. Dep. Agric. Irrigation Exp. Sta., Prosser, Washington]

Band-placed 12-12-12 (NPK) fertilizer at 250 lb./ac. mixed with thimet at 3·3 lb./ac. was applied to cut Red Pontiac potatoes at the time of planting. A natural infestation of the 6-spotted leafhopper (*Macrosteles fascifrons*), the vector of purple-top wilt, was supplemented with artificially-introduced peach aphids (*Myzus persicae*) carrying virus Y. Thimet significantly decreased the incidence of the wilt, but did not reduce the incidence of virus Y. F. s.—R.B.

1383 Krijthe, N. **Changes in the germinating power of potatoes from the time of lifting onwards.** *Europ. Potato J.* 1958, **1**, No. 3, 69–72. [Inst. Potato Storage, Wageningen]

Bintje potatoes lifted on 15 Aug. 1956 and stored from mid-September at 2°C., were removed from storage in groups of 20 tubers at fortnightly intervals and allowed to sprout under controlled conditions. The weight of sprouts formed within 28 days of removal from storage reached its

maximum in mid-August, 1957, and began to decrease thereafter. As the storage period progressed, a greater number of eyes sprouted, and the lateral branching of the resulting sprouts increased.—R.B.

1384 Bodlaender, K. B. A. **Inhibition of sprout growth after haulm killing of potatoes.** *Europ. Potato J.* 1958, **1**, No. 3, 28–40, bibl. 15, illus., French and German summaries. [Inst. Biol. Chem. Res. Fld Crops and Herbage, Wageningen]

Potatoes of the late Voran variety were grown for seed and the haulms cut at a height of 10 cm. in mid-July 1957. Large new shoots developed on the cut stumps. DNC as a 20% oil spray, applied at 20 or 40 l./ha., killed this remaining foliage but did not suppress shoot formation ; after 4 weeks new growth was 30–40 cm. tall. ATA or 2,4,5-T applied before DNC inhibited shoot growth almost completely ; best results with 2,4,5-T were obtained by applying it a few days prior to cutting and spraying with DNC. 2,4,5-TP, CIPC and MENA (methyl α naphthaleneacetate) checked growth of shoots to some extent, while propham, phenylurethane (PU), MCPP, MH, TCNB and methylethylnaphthyl ester (METER) had little effect. Tubers sprayed with ATA failed to develop when stored during the winter and planted in April 1958 ; all other tubers were capable of normal growth, though those treated with propham developed more slowly than others. F. s.—R.B.

1385 Hicks, F. W. **Potatoes.** *Rep. Dep. Agric. Tasmania 1957-8*, Hobart, 1959, 37–9.

The sprouting of seed tubers of Medium Brownells was reduced by dip treatments, including streptomycin [rate not given]. Yield and growth rating were unaffected. Agromycin (200 ppm. for 5 min.) improved sprouting of Sebago. Both whole and cut setts of Medium Brownells dipped in aretan and stored in a wet bag showed improved germination compared with setts planted immediately after cutting. All treatments where setts were left in the sun to dry showed lower germination than damp-stored setts.—A.M.H.

1386 Humphries, E. C. **The effects of gibberellic acid and kinetin on the growth of Majestic potato.** *Ann. appl. Biol.* 1958, **46**, No. 3, 346–51, bibl. 2, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

The potato plants were sprayed with GA (50 ppm.), kinetin (0·025 ppm.), or a combination of the two. GA increased both leaf area and dry-matter yield over the short period of the experiment, but there were indications that this increase would not persist to maturity. Kinetin alone depressed leaf area and dry-matter yield, but this did not occur in the presence of GA. The mean net assimilation rate measured over a 2-week period was not significantly reduced by GA. F.s.—M.H.

1387 Madec, P. Le rôle du tubercule-mère dans l'évolution des germes de la pomme de terre. **[The role of the mother-tuber in the development of potato sprouts.]** *Ann. Amélior. Pl., Paris* 1958, **8**, No. 1, 5–30, bibl. 22, illus., English, German and Russian summaries. [Sta. Amélior. Pomme d. Terre, Landerneau, France]

The object of this study, carried out with the potato variety Bintje, was to determine whether the tuber reserves or the eye buds are responsible for sprout development. By grafting eyes on tubers and by inducing the formation of new meristems by eye excision, it was shown that the eye buds have no influence on sprout development which depends solely on the physiological state of the tuber reserves, this state being influenced by storage conditions. By treatments inhibiting germination, it was shown that this influence of the environment on tuber reserves takes place whether the tubers are allowed to sprout freely or not ; this seems to indicate that the mechanism controlling germination and that controlling sprout development are distinct. The incubation, or development, of the mother-tuber is considered a fundamental phenomenon of which the physiological development of the sprouts, controlled by substances provided by the mother-tuber, is only a visible consequence. No hypothesis is advanced on the nature of these substances. [See also *Fld Crop Abstr.* 9 : 1283.]—E.B.O.

1388 Tagawa, T. and Nihsiyama, Y. **On the relativity between copper enzyme and the dormancy of the potato tubers.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 91–2, bibl. 4, English summary. [Hokkaido Univ.]

1389 Bodlaender, K. B. A. De invloed van verschillende daglengten op de ontwikkeling van de aardappel. **The influence of various daylengths on the development of the potato.** *Jaarb. Inst. Biol. Scheik. Onderz. LandbGew., Wageningen 1958*, 1958, 45–56, bibl. 9, illus., English summary.

The maincrop potato variety Alpha was grown under photoperiods ranging from 8 to 20 hr. The critical daylength was found to be between 12–14 hr. Plants grown under short-day conditions developed flower primordia but did not flower and they set tubers 7–10 days earlier than did plants under long-day conditions. The latter flowered, produced longer stems and yielded a greater weight of leaves, stems, roots, and tubers than did short-day plants. Haulms died back progressively later with increasing daylength. F. Eng. s.—R.B.

1390 Koba, S. **Wound healings in cultivated plants. 3. Activities of peroxidase, cytochrome oxidase and tylosinase (polyphenol oxidase) in wounded potato tubers.** [Japanese] *Sci. Bull. Fac. Agric. Kyushu* 1958, **16**, No. 4, 465–72, bibl. 25, illus., English summary.

1391 Claver, F. K. and others. **Growth of excised potato tissue and seedlings under aseptic conditions.** *Phyton* 1958, **11**, No. 2, 129–37, bibl. 22, illus. [Wisconsin Agric. Exp. Sta.]

In this investigation on environmental conditions which favoured growth of potato plants and callus cultures *in vitro*, the distribution of a mycorrhiza-like structure present in many potato tissues, was examined in isolated stem tips, sprout tips, seedling and callus cultures. Antibiotics were tested to free the aseptic cultures of the structure. One tuber from a plant developed on malachite-green medium, two from plants on rimocidin medium, and one on oligomycin medium were found to be free of the structure.—E.B.O.

1392 Jackson, R. D. and Haddock, J. L. **Growth and nutrient uptake of Russet Burbank potatoes.** *Amer. Potato J.* 1959, **36**, No. 1, 22–8, bibl. 18. [Utah Agric. Exp. Sta., Logan]

Russet Burbank potatoes were grown under irrigation in 1954 on a well drained calcareous soil receiving 80 lb. N/ac. and 44 lb. P/ac. Planting and harvesting were on 1 June and 29 October, respectively. Tops and tubers were sampled weekly. Data are given of the cumulative weekly dry-weight yields of tops and tubers during the period 29 July to 29 Oct. The plants began to set tubers when 60 days old and the first tuber samples could be taken on the 67th day. During the periods 88–95 and 102–109 days after planting the tubers attained their maximum rate of growth (154 lb./ac./day). Severe frost occurred after 138 days, but tubers continued to grow until harvest, though at a much reduced rate. At harvest, 78% of the total dry-weight of plants was contained in the tubers. Fresh-weight yields of tubers was 510 bu./ac. Tops increased in N, P and K content for the first 95 days. The N, P and K content of the tops declined by 45, 45 and 80% respectively betweeen 95 and 152 days after planting. The N and P content of tubers increased continuously until harvest, but K uptake became irregular after 124 days. The entire crop contained 139 lb. N/ac., 11·6 lb. P/ac. and 135 lb. N/ac., of which the tubers contained 98 lb. N, 9·7 lb. P and 100 lb. K.—R.B.

1393 Dainty, J. and others. **Studies on the uptake of phosphorus from $^{32}$P-labelled superphosphate by crops. 2. Potatoes.** *J. Sci. Fd Agric.* 1959, **10**, No. 2, 108–14, bibl. 13. [Biophys. Dep., Univ. Edinburgh, Indian Agric. Res. Inst., New Delhi and Edinb. and E. Scot. Coll. Agric., Edinburgh]

In field experiments, Craigs Royal potatoes were grown in soils high and low in available P and received superphosphate at 0, 0·25, 0·5, 1 or 2 cwt. $P_2O_5$/ac., combined with ammonium sulphate at 0·5 or 1 cwt. N/ac. Superphosphate labelled with $^{32}$P was used at 0·25, 0·5 and 1 cwt. $P_2O_5$/ac. Maximum final tuber yields were reached at levels of 0·25 and 1 cwt. $P_2O_5$/ac. on the high- and low-P soils, respectively. Uptake of fertilizer-P in both soils increased with each increment of fertilizer, but decreased steadily throughout the season. There was little uptake of fertilizer-P after 12 weeks from planting. Uptake of soil-P was substantially depressed by additions of fertilizer-P, on both soils. There appeared to be a limit (about 23–27 lb. $P_2O_5$/ac.) to the uptake of P per ac. required to produce the maximum tuber crop. Higher levels of uptake than this on both soils delayed both early tuber development and the attainment of the final yield. Such levels of uptake occurred with 2 cwt. $P_2O_5$/ac. on the low-P soil and with 0·5, 1 and 2 cwt. $P_2O_5$/ac. on the high-P soil.—A.M.H.

1394 Haddock, J. L. and Jackson, R. D. **Some plant nutrient relationships in the potato crop grown on a calcareous soil.** *Amer. Potato J.* 1959, **36**, No. 2, 56–63, bibl. 16. [Utah Agric. Exp. Sta., Logan]

Russet Burbank potatoes grown on calcareous soil of pH 8 containing 300 lb. exchangeable K/ac., fertilized with 80 lb. N and 44 lb. P/ac., yielded 510 bu. tubers/ac. There was a seasonal decline in " quantity factor " (percentage N + $P_2O_5$+$K_2O$) in tops, roots, tubers, and in the whole plant, which was reflected in leaf analysis. The " quantity factor " for the whole season and the " quality factor " (mg. equivalent of each nutrient expressed as a percentage of N+$P_2O_5$+ +$K_2O$ in mg. equivalents) for N and K in tops, roots and tubers indicated the possibility of K deficiency. This was not revealed by leaf analysis. Seasonal " quality factors " for N, P and K in tops, roots and tubers consistently disagreed with those of leaf tissue from the same plant. The ratios N : $K_2O$, N : $P_2O_5$ and $K_2O$ : $P_2O_5$ in tops, roots and tubers, but not in leaf tissue, indicated that N was in ample supply and that K was limiting. In this crop, leaf analysis did not appear to indicate the true nutritional status of the plants.—R.B.

1395 Ophuis, B. G. and others. **The influence of the temperature during handling on the occurrence of blue discolorations inside potato tubers.** *Europ. Potato J.* 1958, **1**, No. 3, 48–65, bibl. 3, Ger. and Fr. summaries. [Inst. Storage and Process. Agric. Prod., Wageningen]

Bruising of potato tubers resulting in a blue discoloration (caused by enzymatic oxidation of

tyrosine) was investigated in 7 potato varieties grown on sandy and clay soils. Noordeling, a variety with a high starch content, was more susceptible than were Eigenheimer, Furore or Voran ; Bintje, Alpha and Record were least susceptible. Tubers low in K and with a high dry-matter content, e.g. those grown on clay soil, were very susceptible to discoloration. Tubers low in K tended to be rich in tyrosine. Poorly-stored or strongly-sprouted tubers were more susceptible to discoloration than were well-stored potatoes. Recommendations for minimizing discoloration were : careful handling ; warming to at least 12–13°C. before removal from storage, and the maintaining of this temperature during mechanical handling. F. S.—R.B.

1396 Fry, Peggy C. **Flavor evaluation of potatoes grown in soils treated with pentachloronitrobenzene.** *J. agric. fd Chem.* 1959, **7**, No. 3, 201–3, bibl. 6. [Nebraska Agric. Exp. Sta., Lincoln]

Tests were carried out to evaluate the change in flavour in cooked potatoes grown in various States of the USA in 1957, in soils treated with PCNB for disease and pest control. Statistically significant changes in flavour were found in 6 cases only, out of 19. Potatoes grown in fine sandy loam showed a slightly greater tendency towards a change in flavour than those grown in silt loam and soil with high content of organic matter. PCNB treatment, however, did not alter the flavour of potatoes to the extent that acceptance by the consumer could be affected adversely.—E.B.O.

1397 Sharma, M. K. and others. **Specific gravity of different zones within potato tubers.** *Amer. Potato J.* 1958, **35**, No. 12, 784–8, bibl. 7. [Michigan Agric. Exp. Sta., E. Lansing]

Tubers of 14 potato varieties grown in 1956 and 15 varieties grown in 1957 were pared to separate the following zones: (1) cortex (from the tuber surface to the vascular ring) ; (2) from the vascular ring to a point slightly less than half way to the centre of the tuber ; this region contains scattered vascular tissue ; (3) the inner zone (pith). The sp. gr. of zone 3 was invariably the lowest and was relatively constant for all varieties. In tubers of varieties of high sp. gr., but not in those of low sp. gr., zones 1 and 2 had a considerably higher sp. gr. than zone 3. There was little difference in average sp. gr. between zones 1 and 2. The texture of cooked Chippewa tubers (low sp. gr.) was more uniform than that of Delus tubers (high sp. gr.).—R.B.

1398 Lugt, C. Sorteren op doorwas met behulp van zout water. [**Sorting of potatoes showing secondary growth by the use of brine.**] *Meded. 29 Inst. Biol. Scheik. Onderz. LandbGew.* 1957, pp. 4.

Brine baths of 1·035 to 1·115 sp. gr. were used for the fractional separation of Bintje and Eigenheimer potatoes which had sprouted in the ground before harvest. Tubers separated by this means were tested for structure and mealiness. "Glassy" tubers had the lowest sp. gr. ; no glassy potatoes were found in samples of Eigenheimer which sank in a bath of sp. gr. 1·075. The corresponding critical sp. gr. for Bintje tubers was 1·055. Soft tubers separated at sp. gr. 1·085 for Eigenheimer and 1·065 to 1·075 for Bintje ; tubers which sank in this bath were all sound. Tubers with a very high sp. gr. were too mealy and had a tendency to break during cooking. Potatoes tended to turn brown in bruised areas if left too long in the salt solution. [See also *Fld Crop Abstr.* 11 : 1130.]—R.B.

1399 Sawyer, R. L. and Dallyn, S. L. **Nitrogen fertilization of potatoes.** *Amer. Potato J.* 1958, **35**, No. 9, 645–50, bibl. 3. [Cornell Univ., Ithaca, New York]

Potatoes, var. Katahdin and Cobbler, were grown in 1954–7 in irrigated plots fertilized with 140 lb. $P_2O_5$/ac., 140 lb. $K_2O$/ac., 50 lb. MgO/ac., and various levels of N up to 210 lb./ac. applied at planting and as side-dressings when plants were just emerging or were 4–6 in. high. Maximum yields were consistently obtained with N levels greater than 140 lb./ac. In 1954, yields of Katahdin were not increased by N applications higher than 175 lb./ac. Yields of Katahdin in 1955 and of Cobbler in 1954 and '5 increased with increasing N applications up to 210 lb. N/ac. 70 lb. N/ac. at planting followed by 70 lb. N/ac. as an early or late side-dressing gave the same yields as 140 lb. N/ac. applied at planting. Maturity was delayed where less than 70 lb. N/ac. was applied at planting. High levels of N tended to produce tubers of lower sp. gr. than did low levels. Early side-dressing tended to hasten maturity. Where haulms were allowed to die back there was no consistent difference between the effect on yields of applying all the N at the time of planting or at maturity. Yields of Cobbler were increased in 1956 by early side-dressing. Early side-dressing of both varieties gave tubers of higher sp. gr. than did late side-dressing. The various N treatments had no effect on the keeping quality of the tubers. Tubers from plants which were not side-dressed tended to produce the lightest-coloured potato crisps.—R.B.

1400 Smith, W. L., Jr, and Smart, Helen F. **Suberin and wound periderm formation and decay of potato slices as affected by duration of tuber storage at 40°F.** *Amer. Potato J.* 1959, **36**, No. 2, 64–9, bibl. 6. [Agric. Mktg Serv., U.S. Dep. Agric., Beltsville, Maryland]

Tubers of 8 varieties removed from storage at

40°F. shortly after harvest or after 3·5, 5·5 and 8 months, were sliced and transferred to moist conditions at 70°F. for 1, 2, 3 or 4 days. Rather rapid formation of suberin and wound periderm occurred after all storage periods, but it was most rapid in recently-harvested tubers. The rate of suberization and periderm-formation decreased during the first 3·5 months of storage, and remained constant thereafter in all varieties except Green Mountain, in which it remained relatively constant during the whole storage period. Inoculation of the slices with *Erwinia atroseptica* showed that at 70°F. bacterial decay was inversely related to the rapidity of protective barrier formation. F. s. —R.B.

1401 Thompson, N. R. and Isleib, D. R. **Sprout inhibition of bulk stored potatoes.** *Amer. Potato J.* 1959, **36**, No. 1, 32–4, bibl. 5, illus. [Michigan Agric. Exp. Sta., E. Lansing]

Katahdin potatoes stored at one end of a 50 × 200 ft. building, which contained no cross walls, were partitioned off from the rest of the building by plastic sheeting. On 8 May, 1957, 3·5 gal. of 36% NAA ester were sprayed into the intake of the air circulation system and 10,000 bu. of tubers were exposed to the vapour. Tubers were sampled before and after treatment and then stored at 60°F. for 37 days. The sprouting of tubers treated with NAA was inhibited satisfactorily and tubers so treated remained in marketable condition until July.—R.B.

1402 Craft, C. C. and others. **Study of the phenolic compounds in potato tubers during storage.** *Amer. Potato J.* 1958, **35**, No. 9, 651–61, bibl. 17. [Agric. Mktg Serv., U.S. Dep. Agric., Beltsville, Maryland]

The chlorogenic-acid content of Russet Rural tubers was 15 mg., or less, in the cortex tissue and 3 mg., or less, in the pith tissue. The total content of phenolic compounds and *o*-dihydroxyphenols did not change significantly in Russet Rural or Kennebec potatoes stored for 5 months at 55° or 40°F., or for 3 months at 32°F. After storage for 4 months at 32°F. both varieties exhibited tuber damage caused by low temperature ; the total content of phenolic compounds and *o*-dihydroxyphenols showed small, but significant, increases, probably as a result of low-temperature damage. F. s.—R.B.

1403 Miyamoto, T. and others. **Ventilation of chipping potatoes during the conditioning period.** *Amer. Potato J.* 1958, **35**, No. 12, 778–83, bibl. 3, illus. [Michigan Agric. Exp. Sta., E. Lansing]

Russett Rural potatoes were stored at 70°F. for 3, 5, 7 and 9 weeks, with or without adequate ventilation, in dry air, dry air + 10% $CO_2$, and moist air. Tubers in dry, well-ventilated storage for 7–9 weeks produced the lightest-coloured potato crisps. Moisture, the addition of $CO_2$ and poor ventilation increased tuber decay during storage. —R.B.

1404 Wilson, A. R. **Indoor bulk storage of potatoes.** *Fmg Rev.* 1958/9, No. 10, 16–20, illus. [Scottish Hort. Res. Inst., Mylnefield, Invergowrie, Perthshire]

A review is given of the practical considerations involved.—P.J.B.

1405 Madsen, K. A. and Salunkhe, D. K. **Morphological and chemical changes in gamma-irradiated carrots and potatoes.** *Proc. Utah Acad. Sci.* 1958, **35**, 169–70. [Abstract] [Utah State Univ., Logan]

Potatoes given more than $1 \times 10^4$ rep $\gamma$-radiation failed to sprout during 6 months' storage at 50°F. Radiation had no effect on dry-matter content, but increasing doses decreased the pH of the tubers, slightly increased the starch content and slightly decreased the amylose content.—R.B.

1406 Nutt, J. D. **The 1957 potato crop [in Scotland].** *Econ. Rep. 53 Edinb. E. Scot. Coll. Agric.*, 1958, pp. 11.

The costs, per ac. and per ton, of growing potatoes for ware and seed in south and east Scotland, are analysed. The costs of manuring, labour, power and storage, which are to some extent at the discretion of the farmer, are considered in more detail. The results suggest that high manuring is not necessarily economic and that as good margins of profit can be obtained at lower levels of expenditure on manures. Consideration of the position of the potato crop in the rotation suggested that the greatest returns from applied fertilizers were obtained when the crop followed grass.—A.M.H.

1407 Quemener, J. Compte rendu d'activité de la Station de Saint-Germain-en-Laye. **[Report on the work of the Station at Saint-Germain-en-Laye (France).]** *Pomme d. Terre franç.* 1959, **22**, No. 234, 3–20, bibl. 13.

A brief account is given of investigations on potatoes, particularly with regard to yield, precultivation [see *Fld Crop Abstr.* 7 : 917] and control of mildew [name not given].—E.B.O.

## SWEET-POTATOES

1408 Joubert, T. G. la G. **Seedling 4-95 becomes Mafutha T.P. New sweet potato variety shows promise.** *Fmg in S. Afr.* 1959, **34**, No. 12, 46–7, illus. [Hort. Res. Sta., Pretoria]

The origin and characteristics of the sweet-potato var. Mafutha T.P. are described and its yield compared with those of 6 other varieties.—A.M.H.

1409 KANTACK, E. J. and MARTIN, W. J. **Effect of internal cork on yield and grade of sweet potato roots.** *Phytopathology* 1958, **48**, No. 9, 521–2, bibl. 5. [Louisiana State Univ., Baton Rouge]

Internal cork disease had no significant effect on yield or grade of sweet-potatoes, but culinary quality was affected.—R.B.

## CASSAVA

1410 NORMANHA, E. S. Sistemas de colheita da mandioca. [**Methods for harvesting cassava (in Brazil).**] *Agronômico, Campinas* 1958, **10**, No. 7–8, 5.

Simple hand methods are described. On compact soils a man can harvest *c.* 500 kg. of roots per day ; on light soils, 1000 kg. or more. On sandy soils cassava can be harvested by machine, in which case it is first necessary to remove the tops.—E.B.O.

1411 CHANT, S. R. **A note on the inactivation of mosaic virus in cassava (*Manihot utilissima* Pohl.) by heat treatment.** *Emp. J. exp. Agric.* 1959, **27**, No. 105, 55–8, bibl. 9, illus. [Fed. Dep. Agric. Res., Ibadan, Nigeria]

Cassava mosaic virus was inactivated by growing infected cuttings at 35–39°C. for 28–42 days. Treatment at 39°C. gave a greater proportion of healthy plants than treatments at lower temperatures, but fewer plants survived at the higher temperature. The virus in green shoots was more susceptible to heat treatment than that in woody shoots.—A.M.H.

## YAMS

1412 WATSON, K. A. **Agronomy section. Experiments report. Yam beetle trials.** *Rep. Dep. Agric. N. Nigeria. Pt 2 1956-7* [n.d.], pp. 57–8. [Received Feb., 1959]

Various insecticides were compared for their effect on yam beetle (*Heteroligus* sp.). The yam seed-tuber was rolled in the insecticidal dust before planting. Agrocide 7, 2·6% BHC and 10% DDT all increased tuber yields significantly. Agrocide 7 and 2·6% BHC produced the highest proportion of marketable yams.—A.M.H.

## JERUSALEM ARTICHOKE

1413† KOITZSCH, R. and SCHULZ, K. Mietenlagerungsversuche mit Topinambur. [**Clamp storage of Jerusalem artichoke.**] *Z. landw. Vers. UntersuchWes.* 1958, **4**, No. 1, 65–78, bibl. 4, Russian and English summaries.

Tubers of *Helianthus tuberosus* were stored immediately after harvest in earth clamps of various depths (20, 30 and 50 cm.) to test the effect of depth of pit on storage. Temperatures were read with a copper-constantan thermocouple. So long as the crop remained sound there was little difference between the temperature readings in the clamps. Rotting or germination could be detected by a rise in temperature. The tubers could not be stored safely when the temperature reached 10°C. Deeper pits are more satisfactory than shallower ones because they delay the warming of the tubers by outside air, the temperature of which rises during the storage period. Because of the short period (5–7 weeks) during which *H. tuberosus* can be safely stored before feeding, ensilage is recommended.—D.B.

## KALE

*See also Abs. 1550, 1637.*

1414† OPSAHL, B. Forsøk med fôrmargkål. **Trials with marrow stem kale.** *Forskn. Fors. Landbr.* 1958, **9**, No. 4, 295–313, bibl. 21, English summary. [Roy. Agric. Coll. Norway, Vollebekk]

The results are given of 6 trial series with marrowstem kale in south-eastern Norway. In 34 trials, respective mean dry-matter yields of marrowstem kale and Dales Hybrid turnip were 779 and 769 kg./decare. In 4 trials, respective mean dry-matter yields of marrowstem kale and Bangholm swede were 720 and 859 kg./decare, under conditions of moderate fertilizer application. In 19 trials, respective mean dry-matter yields of Wisconsin 240 and Kingscroft KF maize were 174 and 106 kg./decare below those of marrowstem kale. In 12 sowing-date trials, dry-matter yields of Dales Hybrid turnip sown at 2 dates 14 days apart were 842 and 706 kg./decare and those of marrowstem kale were 815 and 667 kg./decare, respectively. Mean yields of thinned and unthinned marrowstem kale in 34 trials were 769 and 779 kg. dry matter/decare, with dry-matter contents of 13·2 and 14·1%, respectively. Unthinned crops outyielded thinned crops only where yield levels were relatively low. In 4 trials, mean dry-matter yields of marrowstem kale sown at rates of 500 and 250 g./decare were 706 and 639 kg./decare at moderate levels of manurial treatment. There was no apparent interaction between seed rates and fertilizer treatment. Increases in the size of individual plants resulted in reduced dry-matter content. The stems had higher dry-matter contents than the leaves, though the marrow of the stem had a very low dry-matter content. Data are given of the composition of marrowstem kale grown under different spacing

and manurial treatments, and of its digestibility.—P.J.B.

1415† Boyd, A. G. **Nitrogen for kale.** *Scot. Agric.* 1958, **38**, No. 3, 157–8, bibl. 2. [W. Scot. Agric. Coll., Auchincruive]

In 3 years' trials at Auchincruive, kale was grown on relatively fertile soil and received a basal dressing of 10 tons f.y.m., 4 cwt. superphosphate and 1·5 cwt. muriate of potash. Applications of sulphate of ammonia were made (a) to the seed bed, (b) at thinning time, (c) half to the seed bed and half at thinning time. Mean fresh weight yields for crops receiving 0, 3, 6 and 9 cwt. sulphate of ammonia/ac. were 26, 29, 30·5 and 30·5 cwt./ac. and mean crude-protein yields were 970, 1160 1310 and 1360 lb./ac., respectively ; time of application had little effect on response to N. There was no apparent advantage from applying more than 3 cwt. sulphate of ammonia/ac.—P.J.B.

## FIBRE CROPS

### COTTON

*See also Abs. 1552, 1562, 1575, 1578, 1583.*

1416 Bederker, V. K. and others. **Studies in the agronomy of Gaorani cotton.** *Indian Cott. Gr. Rev.* 1958, **12**, No. 4, 233–8, bibl. 3. [Cott. Res. Sta., Nanded-Dn, Hyderabad State]

The short growing period is one of the causes of the low yield of cotton in the Gaorani tract of Hyderabad State. The effect of sowing Gaorani 6 (*Gossypium arboreum* var. *indicum*) on 20 May, 5 June, and at the normal time after the monsoon [3rd week in June] was studied and tabulated. Final plant height, yield of seed cotton per ac., number of bolls per plant, boll size, and earliness in maturity improved as the sowing date was brought forward, but only the increase in plant height was statistically significant. Ginning percentage and 100-seeds weight were unaffected by sowing date. Optimum sowing date is determined not only by the growing period but also by soil temperature and moisture. In the Gaorani tract, 20 May appears to be the earliest suitable date ; before the 3rd week in May the soil temperature is too high for germination. The monsoon does not arrive until June, therefore the soil must be irrigated before sowing, after sowing, and thereafter at weekly intervals from germination until the arrival of the monsoon.—D.B.

1417 Bennison, R. H. **Annual report of the Agricultural Officer (Research), Coast Province, 1957.** *Rep. Dep. Agric. Kenya 1957 Vol. 2*, Nairobi, 1959, 123–9.

In cotton variety trials at Kibarani and Msabaha, UK51 and UK55 yielded markedly better than N17. In a year of good rainfall, little difference in yield resulted from sowing cotton early or late in the rainy season [cf. *Fld Crop Abstr.* 11 : 1849]. The earlier sowings suffered greater pest damage. The residual effects of mulching in the previous year produced more vigorous cotton seedlings, but the initial advantage was not reflected in the final yields.—A.M.H.

1418 Calzada, B. J. Efecto de las variaciones de la densidad del cultivo, abonamiento y plagas sobre la producción del algodonero en la Costa Central. [**Effect of plant density, manuring and pests on cotton production in the Central Coast of Peru.**] *Inf. 62 Div. Exp. agric. Minist. Agric. Peru* 1958, pp. 23.

Results are given from 26 trials carried out over several years in different regions of Peru. The treatments tested were : (a) spacing, 1·40 × 0·50 m., 1·20 × 0·40 m., and 1 × 0·30 m., with 2 plants per hill in every case ; (b) manuring, 180 and 360 kg. N (guano) per fanegada (6400 sq. m.). In 14 trials the cotton was sown and in 12 it was grown from ratoons ; in 20 trials pest attack was light, and in 6 serious. The main conclusions were : (a) higher yields were obtained from ratoons than from seed ; (b) in the northern region yields were affected more by plant spacing than by manuring and vice versa in the south, but they generally increased with a decrease in plant spacing and manuring ; (c) sown crops benefited more from manuring than those grown from ratoons ; (d) in the northern part manuring was more effective at the widest spacing, while in the south it was more effective at the medium spacing.—E.B.O.

1419 Wood, I. J. L. **Cash in on irrigated cotton.** *Qd agric. J.* 1959, **85**, No. 2, 107–14, illus.

Irrigated cotton in the Dawson and Callide valleys in central Queensland in 1957 and '58 yielded more than double that grown under dryland conditions. For the highest yields and quality the following recommendations are made : prepare the land early, preferably in June for old arable land and earlier for new ground ; sow in mid-Oct. at 15 lb. seed/ac. ; cross-cultivate early with light spike-harrows or fine-fingered weeders, preferably on a hot day ; irrigate early to avoid moisture stress.—A.M.H.

1420 Bespalov, N. and Junusov, R. [**Irrigation regime for cotton in the Hunger Steppe.**] [Russian] *Hlopkovodstvo (Cott. Prod.)* 1958, **8**, No. 10, 24–8. [Pahta-Aral'sk Exp. Sta., Kazah Inst. Agric., USSR]

The most suitable irrigation regimes for cotton grown in the different conditions of the Hunger Steppe [approx. 46°N., 72°E.] are : (1) on old irrig-

ated areas where the ground-water level is 1·5–2·5 m., two or three waterings of 1000–2000 cu.m./ha. should be given (irrigation norm = 2000–3000 cu.m.), the first watering being given at the budding phase or the beginning of flowering, and the last during 15–20 Aug. Where the ground-water level is deep (2·5–4 m.) three or four waterings of 1000–1100 cu.m./ha. are required (irrigation norm = 3000–4000 cu.m.), the first being supplied at mass budding and the last on 20 Aug. ; (2) on lands of 1st-year irrigation where the ground-water is at 8 m., seven waterings of 800–1300 cu.m./ha. should be given, (irrigation norm 7700 cu.m.), the first at the beginning of budding and the last on 10 Sept. ; (3) on areas of 2nd-year irrigation with ground-water at 5–6 m., six waterings of 900–1200 cu.m./ha. are required, (irrigation norm 6500 cu.m.), the first at the beginning of budding and the last on 31st Aug. ; (4) on areas of 3rd- and 4th-year irrigation, with ground-water at 4–5 m., five waterings of 900–1200 cu.m. are recommended, (irrigation norm 5400 cu.m.), the first at mass budding and the last on 25 Aug.—M.H.

1421 Velásquez, L. J. Modalidades sobre el cultivo de algodón en las zonas de Santander y Boyacá. [**Methods for growing cotton in the areas of Santander and Boyacá (Colombia).**] *Bol. Divulg., Bogatá* 1958, No. 5, 3–5, illus.

The growing of cotton intercropped with maize, cassava and other crops is described.—E.B.O.

1422 Ayyangar, G. S. and Padaki, G. R. **A short note on the possibilities for cotton production in the rice fallows of the Andhra State.** *Indian Cott. Gr. Rev.* 1958, **12,** No. 6, 388–90, bibl. 6.

1423 Indian Cotton Growing Review. **D.C. 109. An outstanding *desi* cotton for the Punjab.** *Indian Cott. Gr. Rev.* 1958, **12,** No. 4, 262.

The strain D.C. 109, recently developed for the S.E. Punjab, possesses the rare combination of high yield (1616 lb. seed cotton per ac.), high ginning out-turn (41·2%), superior fibre length (0·97 in.), and good spinning capacity (23 counts). In all these respects it was superior to the existing *desi* strain Mollisoni 60–A2, and the cash return was Rs. 290/ac. higher.—D.B.

1424 Indian Cotton Growing Review. **Madras Cambodia Uganda Number 2. A long-staple cotton from Madras.** *Indian Cott. Gr. Rev.* 1958, **12,** No. 4, 263. [Indian Central Cott. Cttee]

The new strain MCU-2 is one of the best quality cottons grown in India on a commercial scale at the present time. It is suitable for the 60,000 ac. summer-cropped cotton-area in the Madurai, Ramanathapuram, and Tirunelveli districts of Madras State. It matures within 5 – 5·5 months and is suitable for growing in rotation with rice. It is hoped that MCU-2 will replace imported long-staple cotton. A government scheme for seed certification is in operation.—D.B.

1425 Revilla, M. V. and Juárez, G. L. Control de la "chupadera" del algodonero mediante fungicidas 1957–58. [**Control of damping-off in cotton (*Rhizoctonia solani*) by fungicides in 1957-8.**] *Inf. mens. Esta. exp. agric., La Molina* 1958, **32,** No. 371, 15–20.

In a trial in Peru to test various preparations for controlling *Rh. solani* on cotton, the most effective treatment was rhizoctol, applied dry to the seed at the rate of 453 g. per 100 kg. of seed 24 hr. before sowing, which reduced deaths from damping-off to 8%, against 32% in the untreated control. Germination was not affected by any of the fungicides tested.—E.B.O.

1426 Dobson, R. C. **Effects of systemic insecticide seed treatments on two varieties of cotton.** *J. econ. Ent.* 1958, **51,** No. 4, 495–7, bibl. 4. [New Mexico Agric. Exp. Sta., State College]

Seed of Pima S-1 and Acala 1517C cotton was treated with thimet and Bayer 19639 and sown in mid-April within 2 hr. of treatment. Both materials reduced seedling stands during the early part of the growing season, but by 17 July no differences in stand between the treatments and the controls could be observed. On this date, retarding of flowering was observed in Pima S-1 treated with thimet and in Acala 1517C treated with either insecticide. Total yields of cotton were not affected by either treatment.—R.B.

1427 Parencia, C. R. and others. **Field tests with the systemic insecticides thimet and Bayer 19639 as cotton seed treatments in 1957.** *J. econ. Ent.* 1958, **51,** No. 6, 872–5, bibl. 2. [Texas Agric. Exp. Sta., College Station]

Re-ginned cotton seed with a high percentage of seed-coat injury was treated with 50% thimet dust at a rate adjusted to give the equivalent of 1 lb. a.i./ac. Bayer 19639 as 50% dust was also applied at rates equivalent to 1, 1·5 and 2 lb./ac. Treatment resulted in significant reductions in seedling stands, compared with those from untreated, but injured, seed. Thimet at 1 lb./ac. did not affect seedling stands from acid- or flame-delinted seed. Severe phytotoxicity occurred when thimet-treated seed was sown using seed-drills from which similarly treated seed had previously been sown. Fruiting was delayed, but yields were not reduced. All seed treatments controlled thrips

(*Frankliniella* sp.) for 4 weeks after seedling emergence. Thimet was slightly more effective than Bayer 19639 against cotton fleahopper (*Psallus seriatus*), but effectively controlled this pest for 4 weeks after seedling emergence when applied to reginned seed only.—R.B.

1428 Rivero, J. M. del. La plaga de la "rosquilla negra". 2. Medios de lucha y normas para combatirla. [**The pest *Prodenia litura*. 2. Control methods.**] *Agricultura, Madr.* 1958, **27**, No. 318, 546–50, bibl. 6, illus.

This is a review mainly of chemical methods for controlling *P. litura* [a pest mainly of cotton]. Infestations often begin in rice-fields. Recommendations are made, especially on the use of poisonous baits containing sodium fluosilicate, barium fluosilicate, cryolite, HCH, or toxaphene.—E.B.O.

1429 Toms, A. M. **Some recent trends in cotton yields in the Sudan Gezira, with special reference to the response to spraying with DDT against jassid.** *Emp. Cott. Gr. Rev.* 1959, **36**, No. 1, 5–11, bibl. 3. [Sudan Gezira Board, Barakat]

In 1940–8, before the general use of N fertilizer and DDT spraying on cotton in the Gezira, L varieties of *Gossypium barbadense* outyielded S varieties by about 0·8 kantar seed cotton per feddan [1 k.p.f. = 300 lb./ac.), when the soil productivity factor was eliminated. In 1949–57 the difference between the two types (0·41 k.p.f.) could be wholly accounted for by differences in soil productivity between the areas in which they were grown. Analysis of the results of field trials showed that there was no difference between the varieties in their response to N. The increase in yield due to DDT spraying was 0·93 k.p.f. for S cotton and 0·41 k.p.f. for L cotton. The actual yield increases were less than those calculated. Possible explanations for this are given. It is concluded that, if seasonal yield fluctuations and a possible interaction between fertilizer and spraying are taken into account, it may be assumed that the L varieties are less susceptible to attack by the cotton jassid (*Empoasca lybica*) than the S varieties.—A.M.H.

1430 Singh, S. and others. **Field control of cotton jassid and whitefly in the Punjab.** *Indian Cott. Gr. Rev.* 1958, **12**, No. 6, 391–405, bibl. 13. [Government Agric. Coll., Ludhiana]

Several insecticides were tested for controlling the cotton jassid (*Empoasca devastans*) and whitefly (*Bemisia tabaci*). Spraying the infested crop with a mixture containing 0·1% DDT and 0·1% BHC suspensions, or 0·02% endrin emulsion, at 50–100 gal. of spray material per ac. at 2-week intervals effectively controlled these pests, so that the increase in yield of seed cotton more than compensated for the cost of the insecticides. Phosphatic insecticides gave high initial kill but were unable to keep the population of these pests suppressed for any length of time because of their low residual effect. F. S.—D.B.

1431 Choyce, M. A. **Insecticide trials [on cotton].** *Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. 1957-8 N. Nigeria*, London, 1959, 12–15.

In one trial at Mokwa, 1 lb. DDT + 0·5 lb. BHC in 40 gal. water/ac. was applied at weekly intervals from 30 Aug. to 25 Oct., 1957, or on 4 or 6 dates within this period. The highest yields (986 and 981 lb. seed cotton/ac., respectively) were from the treatments receiving 9 weekly applications of insecticide, or 6 applications between 6 Sept. and 11 Oct. Other treatments yielded 661–853 lb. seed cotton/ac., compared with 468 lb./ac. from the unsprayed control. In a further trial in which all plots received 8 applications of insecticide at weekly intervals from 4 Sept. to 4 [24?] Oct., 0·3 – 0·5 lb. $\gamma$ BHC + 1–2 lb. DDT per ac. resulted in yields of 916–969 lb. seed cotton/ac., compared with 648–674 lb. /ac. for treatments from which the DDT was omitted and 508 lb./ac. for the control.—A.M.H.

1432 Walker, R. L. and others. **Effectiveness of several insecticides against the boll weevil, bollworm and cotton leafworm.** *J. econ. Ent.* 1958, **51**, No. 6, 783–6. [S. Carolina Agric. Exp. Sta., Clemson]

Good control of *Anthonomus grandis* was obtained in 1956 using dust treatments of thiodan, dust or spray treatments of guthion/DDT, methyl parathion/DDT, EPN/DDT, and endrin, and sprays of guthion, dipterex and dipterex/DDT. Yields of cotton were considerably increased by all treatments. Spraying with guthion/DDT resulted in significantly higher yields than did toxaphene or heptachlor/DDT sprays. In 1957, dusts of sevin (1-naphthyl-N-methyl carbamate), guthion/DDT, and endrin, gave excellent control of *Heliothis zea*, but not of *Anthonomus grandis*; only 20% sevin dust resulted in a significant increase in yield.—R.B.

1433 Tuttle, D. M. and Wene, G. P. **Early season cotton thrips control in the Yuma, Arizona area.** *J. econ. Ent.* 1959, **52**, No. 1, 35–6, bibl. 3. [Arizona Agric. Exp. Sta., Tucson]

Cotton was treated in 1954–7 with 11 insecticides as foliar applications or as seed treatments to control thrips (*Frankliniella occidentalis*). In 1955, seed treatments with thimet and American cyanamid 12008 effectively controlled thrips, reduced seedling stands by 32 and 68%, respectively, and slightly increased yields of seed cotton. Thimet and Bayer 19639 as seed treatments controlled thrips in 1956 and '57, but reduced cotton yields slightly in some trials.—R.B.

1434 Beingolea, G. O. Acción de insecticidas sobre la fauna benéfica del algodonero. [**Effect of insecticides on the beneficial fauna of cotton.**] *Inf. 107 La Molina Esta. exp. agric., Peru* 1958, pp. 37, bibl. 20, English summary.

For the control of the lesser cotton leaf worm (*Anomis texana*) on cotton in the Costa Central of Peru, arsenical insecticides are recommended, especially lead arseniate, which is only slightly toxic to the beneficial insects concerned with its biological control, whereas endrin is highly toxic. In trials to control *Empoasca* spp. on cotton, a mixture of 4% rotenone (about 3 lb./ac.) and sulphur was harmless to the beneficial insects but very effective against *Empoasca* spp. although it lacked residual effects.—E.B.O.

1435 Demol, J. and Niclaes, J. Contribution à l'étude des variations de la résistance de la fibre de coton en relation avec les facteurs du climat. [**Contribution to the study of variations in the strength of cotton fibre in relation to climate.**] *Bull. agric. Congo belge* 1958, **49,** No. 5, 1291–1300, bibl. 4, Flemish summary. [Sta. Rech. Agron. INÉAC, Bambesa, Belgian Congo]

The results from trials in 5 localities in the north of the Belgian Congo confirmed that high intensity of light, high temperature and low rainfall increase the strength of cotton fibre.—E.B.O.

1436 Raes, G. Note au sujet du grisaillement du coton et de la répercussion de ce grisaillement sur la qualité du coton. [**Note on grey discoloration of cotton and the importance of this factor in cotton quality.**] *Bull. agric. Congo belge* 1958, **49,** No. 6, 1513–16, Flemish summary. [Univ. Gand, Belgium]

Grey discoloration of cotton is caused by exposure of the fibres to climatic factors, such as sunshine, dew and damp air after boll-opening, and its intensity varies with varieties.—E.B.O.

1437 Plaisted, P. H. **The effect of 2,4-dithiobiuret on some of the biochemical components of cotton and coleus plants.** *Contr. Boyce Thompson Inst.* 1959, **20,** No. 1, 83–101, bibl. 39.

In pot trials, cotton (*Gossypium hirsutum*) seedlings, 40–60 days old, were treated with 1–2 g. dithiobiuret applied to the soil surface. Leaf abscission occurred, but there was no apparent morphological change in the leaves. The protein content per leaf increased from 73 to 93 mg. in treated plants, and remained higher than in untreated plants for 72 hr., or until abscission occurred. The ratios between the concentrations of various amino acids were different in treated and untreated leaves. Treatment increased the rate of respiration by 50%, but had no effect on the respiratory quotient, which was approximately unity. Untreated plants exposed to $^{14}CO_2$ for 48 hr. were approximately twice as radioactive as treated plants.—R.B.

1438 Singh, S. and Simlote, K. M. **Response curves and optimal doses for *desi* cotton in Malwa.** *Indian Cott. Gr. Rev.* 1958, **12,** No. 5, 327–31, bibl. 3. [Inst. Pl. Ind. Indore]

Groundnut cake and $(NH_4)_2SO_4$, each applied at 20, 40, 60 and 80 lb. N/ac., were compared for their effect on yields of seed cotton. At each level of N, the differences between the effects of the 2 N fertilizers were not significant. Taking the average yields for each fertilizer (at all levels), groundnut cake gave higher, but not significantly higher yields than did $(NH_4)_2SO_4$. Taking cost of fertilizer and profits into consideration, the optimal dose of N for local cotton in Malwa was 40 lb. N/ac. applied as $(NH_4)_2SO_4$. The cost of groundnut cake was too high to justify its use.—D.B.

1439 Bederker, V. K. and Shaligram, G. C. **Effect of fertilizers on the Gaorani cotton plant.** *Indian Cott. Gr. Rev.* 1958, **12,** No. 6, 381–7, bibl. 7. [Cott. Res. Sta., Nanded, Dn]

The effect of N and P fertilizers on development of the cotton variety ' Gaorani 6 ' was studied. The fertilizers were applied either alone or together at 30 lb. N and 30 lb. $P_2O_5$ per ac. Data on the effect of these dressings on several aspects of cotton development are tabulated. N increased plant height, especially during the 2nd and 3rd month after sowing. Both fertilizers (N to a greater extent than $P_2O_5$) caused earlier flowering and earlier opening of bolls and increased the number of buds, flowers and ripe, picked bolls per plant.—D.B.

1440† Uzbek Academy of Agricultural Sciences, Taškent. **Bulletin of scientific/technical information from the All-Union Scientific Institute for Cotton Research.** 1957 [issued 1958], No. 2, pp. 66.

The Bulletin includes information (from the cotton-growing regions of the USSR) on : selection and seed production of cotton, lucerne, maize, sorghum, and other fodder/grain crops ; crop rotations in cotton fields ; soils in the cotton-producing regions ; irrigation ; improving saline areas ; and the economics of cotton production.—M.H.

1441 Institut de Recherches du Coton et des Textiles Exotiques. Activité de l'IRCT 1956. [**The work of IRCT during 1956.**] *Cot. et Fibr. trop.* 1958, **13,** No. 1, 1–237, illus.

Cotton investigations reported :

1. French Equatorial Africa. Bambari Station, Ubangi-Shari, pp. 13–33. In regional trials, the yields of the varieties D-9, A 150 and TK-1 were

equal in some areas, but D-9 generally gave the highest yields and the quality of its fibre was comparable to that of A 150 ; D-9 multiplied on 185 ha. in 1956, is the variety best adapted to the whole area supervised by the Bambari Station ; TK-1 is of interest for its resistance to " bacteriose" and " fusariose". By applying 250 kg. of sulphate of ammonia, 100 kg. bicalcium phosphate and 100 kg. potassium chloride per ha. on deteriorated soils, yields of 50–100 kg. seed-cotton per ha. were obtained ; this same dressing, applied to a soil the structure of which had been improved by a fallow with " sissongo ", increased yields of seed-cotton by 700 kg./ha. over the yield from the unmanured control (1000 kg./ha.). Dusting cotton seed with granopera 0·5% is recommended. Bossangoa Station, Ubangi-Shari, pp. 34–42. In regional trials Allen 150 was again superior to Samaru which is grown throughout most of the western area. In a sowing-date trial, Allen 150 was sown on 5 and 20 June, 5 and 20 July and 5 Aug. ; yields were highest in the plots treated with endrin and sown on 5 June (1310 kg. seed-cotton per ha.), and decreased regularly with later sowing dates to 739 kg. for the sowing on 5 Aug. In a trial of insecticidal-treatment dates, Allen 150 was sown on 29 June and sprayed with endrin Shell at 2 l./ha. (about 400 g. active material per ha.) on : (a) 11 Oct. ; (b) 25 Sept., and 11 Oct.; and (c) 25 Sept., 11 Oct. and 24 Oct. Treatment (b) (applied during the 3rd and 5th week of flowering), was better than (a) and little different from (c), being effective mainly against insect borers, which are the main cause of parasitic boll-shedding. Tikem Station, Chad, pp. 43–60. Results from varietal trials confirmed that Allen 151, although not the highest yielding variety under all conditions, is preferable to all other varieties as its yield and quality are generally satisfactory. From manurial trials it is concluded that : (a) the application of crushed cotton-seed at 1 metric ton per ha. increases cotton yields by 20–25% ; (b) the application of farm-yard manure at 15 tons per ha. increases yields by 15–50%. In an investigation on varietal susceptibility to boll pests, 58-151 had 17% affected bolls, and Allen common type 25%. Bededjia Station, Chad, pp. 61–93. 150-K was generally the highest yielding variety, and was better than A 150. Madingou Station, Middle Congo, pp. 94–6. In a trial with Allen 150, sowings on 15 Jan. and 1 Feb. gave higher yields (1390 and 1379 kg./ha., respectively) than sowing on 1 Jan. or 15 Feb.

2. French West Africa and Togoland. Bouaké Station, Ivory Coast, pp. 97–114. In varietal trials with *Gossypium barbadense*, Mono 55 was best both when grown alone or in association with maize. M'Pesoba Station, French Sudan, pp. 115–26. In trials in the northern zone to compare A 151, A 333 and A 51-63, there were no differences between these varieties in the Sudan, while in Upper Volta A 151 and A 51-63 were about equal, and more productive than A 333; A 151 was the best with an average of 609 kg./ha. and a ginning return of 36·7% ; in the southern zone Allen 151 was best with 274 kg./ha. and a ginning return of 36·3%, while in Upper Volta Allen 333, manured and treated, was best with an average of 1085 kg./ha. and a ginning return of 37%. In trials to compare insecticides, endrin was the most effective preparation against *Heliothis* sp., *Diparopsis* sp. and *Earias* sp., while actidrine phosphemol was the best against *Argyroploce* sp. and was effective also against *Diparopsis* sp. Anié-Mono Station, Togoland, pp. 127–36. In a spacing trial with the variety Mono 56, grown alone in rows 1·8 m. apart, the best spacings in the row were 50 cm. with 1 plant per pocket, and 75 cm. with 2 plants per pocket. In Togoland the whole cotton area is sown with Anié 52, 53, 54 and 55 but Mono varieties were best in some trials ; in trials in Dahomey Anié 55 or Mono 54 were best, depending on the regions.

3. North Africa. Morocco, Tadla Station, pp. 137–60. Flowering in the varieties Pima 67 (*G. barbadense*) and Paymaster (*G. hirsutum*), both sown on 27 March, began on 25 June. Maximum flowering occurred during 16–20 July in Paymaster with an average of 1·11 flowers per day per plant, and during 21–31 July in Pima 67 with an average of 0·7 flowers per day per plant. The number of flowers which appeared on a plant during the whole flowering period was 19·62 for Pima 67 and 30·13 for Paymaster, which resulted in 14·52 and 13·01 bolls per plant with 27·47% and 56·82% shedding, respectively. Results from manurial trials indicated that : (a) the highest yields were obtained from applying 300 kg. $P_2O_5$/ha. (natural phosphates) ; (b) there was no advantage from exceeding 80 kg. $K_2O$/ha. In irrigation trials lasting 3 years the highest yields (1920, 2320 and 3530 kg./ha.) were obtained by irrigating 6 times during 1 Apr.–end June, 4 times during 1 July–15 Aug. and 3 times during 20 Aug.–15 Sept. with a total of 7800 cu. m. of water per ha. To control *Earias insulana* the recommendation is to spray with endrin (500 g. active material per ha.) once or twice in June and to dust with cryolithe 60% (15 kg./ha.) once or twice in July–Aug. In years of severe infestation a 5th treatment could be given in Aug. For treating seeds against " bacteriose", mercury preparations were highly effective, granopera and panogen being the cheapest. Algeria, Textile Section of Perregaux, pp. 161–9. At Hamadena the best sowing method with the variety Pima was found to be : ridges 1 m. apart ; pockets 20 cm. apart ; thinning to 2 plants ; density 100,000 plants/ha. The varieties recommended are : Karnak 55 (long fibre) for the Cheliff plain and Dendera

(early, medium-length fibre) for the Saint-Denis-du-Sig region.
4. Madagascar, Tuléar province, pp. 173–91. Irrigated cultivation. Stoneville yielded consistently more than Acala. In an irrigation trial these two varieties yielded best (2435 and 2265 kg./ha., respectively) with 7750 cu. m. of water (1730 from rainfall and the remainder from 7 irrigations) ; in this treatment no irrigations were given on 1 and 16 Feb. (before the beginning of flowering), as they were in other treatments. Sowing in December was considerably better than in March.—E.B.O.

1442 Spence, J. R. and others. **West Indies Cotton Experiment Stations. Progress report for the season 1957–58.** *Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. 1957–8, W. Indies* London, 1959, 3–8.

Manuring, pp. 3–6. In Montserrat, there were significant responses to 300 lb. ammonium sulphate/ac., ranging from 27 to 239 lb. lint/ac. In a further trial, N significantly increased yield and seed weight, but decreased ginning %. The time of application of N (at sowing, 5 weeks later, or half at each date) did not affect yield. Spacing, pp. 6–8. In one trial in Montserrat, a population of 21,780 plants/ac. gave a significantly higher yield than 10,890 plants/ac., where a constant ridge width of 4 ft. and spacings of 6–24 in. along the ridges were used. In Antigua, sowing 20 seeds/hole gave a slightly better stand than sowing 5 seeds/hole, but the lower rate gave a higher % germination. Delaying thinning from 10 to 31 days after sowing had little effect. Spacing at 4 × 1 ft. gave significantly higher yields than spacing at 4 × 2 ft. and 2 plants/hole yielded more than 1 plant/hole, especially at the 2-ft. spacing.—A.M.H.

## FIBRE FLAX

*See also Abs. 1496, 1550.*

1443 Elliott, H. G. **Linen flax in Western Australia.** *J. Dep. Agric. W. Aust.* 1959, **8,** No. 1, 77–89, illus.

The history of fibre-flax production in Australia and elsewhere is summarized. Information is given on the cultivation, harvesting and processing of fibre flax in Western Australia.—A.M.H.

1444 Elliott, H. G. and Ryan, F. E. **Flax as a rotation crop in the higher rainfall areas of Western Australia.** *J. Dep. Agric. W. Aust.* 1959, **9,** No. 1, 45–8, illus.

The economics of growing fibre flax as a cash crop in the dairying districts of Western Australia are discussed in the light of yields obtained in trials in 1955–7. [See following Abs.]—A.M.H.

1445 Elliott, H. G. and Ryan, F. E. **Flax variety experiments at Bramley and Manjimup, 1955–57.** *J. Dep. Agric. W. Aust.* 1958, **7,** No. 6, 687–91, illus.

In fibre-flax trials at Bramley Research Station in 1955–7, Liral Crown gave the highest straw yield, followed by Boyup and Concurrent. Concurrent had the highest line-fibre recovery (13·9%). Liral Crown is not grown commercially as it is very susceptible to rust [*Melampsora lini*]. In the Manjimup area in 1956–7, Boyup, Liral Crown, Wada, Weira and Concurrent yielded equally well. The mean yield of straw per ac. was 48·6 cwt., compared with 32·5 cwt. at Bramley.—A.M.H.

1446 Grümmer, G. Die Beeinflussung des Leinertrages durch *Camelina*-Arten. **[The influence of *Camelina* species on flax yields.]** *Flora, Jena* 1958, **146,** 1/2, 158–77, bibl. 7. [Inst. Agrobiologie, Univ. Greifswald, E. Germany]

Experiments confirmed observations that flax yields were reduced when *Camelina* was present as a weed. Different species of *Camelina* produced approximately the same reduction in yield. The reduction could not be attributed to root excretions by *Camelina*, but to growth-inhibiting substances which could be washed out of its leaves (by sprinkling or rain). Extracts from *Camelina* leaves also reduced flax yields. F. s.—D.B.

1447 Muskett, A. E. **Studies on seed health. 1. Flax.** *Ann. appl. Biol.* 1958, **46,** No. 3, 430–45, bibl. 16. [The Queen's Univ., Belfast]

A survey was made during 1940–55 to determine the incidence of the seed-borne fungal parasites of flax. Fibre-flax seed produced in eastern and south-eastern England was relatively free from contamination with *Colletotrichum linicola*, *Polyspora lini* and *Phoma* sp. and there was no build-up of infection in seed stocks in these areas. In the wetter and cooler regions west and north of the Pennines, seed contamination tended to increase. Seed contamination with *Botrytis cinerea* was general throughout the UK, with a tendency to be higher in coastal and upland areas. The incidence of *Fusarium lini* and *Alternaria linicola* in fibre-flax seed produced in the UK was negligible. The examination of seed samples from other countries indicated the possible importance of *P. lini* in Denmark, of *B. cinerea* and *C. linicola* in the Netherlands, of *A. linicola* as a contaminant of oil-flax seed in Sweden, and of *C. linicola* in parts of Canada. To avoid seed infection, production of seed flax should be limited to areas where the risk of contamination is slight or absent. Where there is any risk of a build-up of contamination, seed disinfection using a thiram preparation should be carried out as a routine practice each season. F. s.—M.H.

1448 Aukema, J. J. De beschadiging van vlas door chloor-IPC. [**Damage to flax from CIPC.**] *Meded. 18 Proefsta. Akker- en Weidebouw, Wageningen* 1958, pp. 48, mimeo., illus.

Reports of injury to fibre-flax crops in the Netherlands from the treatment of neighbouring crops with CIPC were followed in 1958 by a study of 14 cases of damage from spray drift. The maximum distance between the CIPC-treated crops and the injured fibre flax was 120 m. Contact with CIPC resulted in a thickening or curvature of the stem, according to the stage of the plant's growth, and greatly reduced fibre quality. Occurrence of the injury was independent of : the direction of the wind at the time of spraying the neighbouring crop, nozzle type, droplet size, spray volume and formulation. It appeared probable that the herbicide was carried to the fibre flax in the vapour phase, since CIPC has a relatively rapid rate of evaporation [see *Fld Crop Abstr.* 6 : 1133]. The temperature at which damage occurred ranged from 7° to 21°C., but it has not been ascertained whether a given minimum or maximum temperature is necessary for damage to occur.—G.M.R.

## JUTE

1449 Lin, C. F. **Effect of fertilizer on jute production in Taiwan.** *Soils and Fert., Taiwan* 1956–7, **5,** 8–18, bibl. 9. [Taiwan Agric. Res. Inst.]

N at 80 kg./ha. and $K_2O$ at 60 or 120 kg./ha. significantly increased the yields of retted jute fibre from the vars. Sinfon Green Stem and Taichung No. 1. The effect of $K_2O$ increased as the rate of N application increased. $K_2O$ increased disease resistance. $P_2O_5$ at 40, 80 or 120 kg./ha. produced no significant increase in yield. However, an application of 40 kg. $P_2O_5$/ha. is recommended to replace $P_2O_5$ removed from the soil by jute. F. s.—D.B.

## *HIBISCUS* SP.

1450 Institut de Recherches du Coton et des Textiles Exotiques. Les succédantes du jute. [**Jute substitutes.**] *Activ. I.R.C.T. 1956* [Cont. in] *Cot. et Fibr. trop.* 1958, **13,** No. 1, 199–211, illus.

French Equatorial Africa. Madingou Station, Middle Congo, pp. 201–7. Investigations are continuing with *Urena lobata, Hibiscus cannabinus* and *H. sabdariffa. U. lobata* was affected by a disease caused by *Macrophoma urenae* ; but variety D.S. 13, under trial, appears to be high-yielding and resistant to this disease. Treating the seed with hot water (65°–67°C. for 20 min.) reduced significantly the incidence of the disease in the plants. *Hibiscus* spp. are generally resistant to *M. urenae* and are easily decorticated by machine but the quality of their fibre is inferior to that of *U. lobata.*

1451 North Africa, Morocco, Tadla Experimental Centre, pp. 209–11. In a varietal trial with *Hibiscus* sp., in which 8 irrigations were given of 650 cu. m./ha. each, Sudan late (185 days) yielded 3798 kg. fibre per ha. and Deroua red (155 days) 3561 kg. It is concluded that these two varieties, which are both sown in early April, are suitable for large-scale cultivation (Deroua red is already thus grown). A trial on harvesting dates indicated that the best quality fibre is obtained by cutting *Hibiscus* sp. at flowering, its fibre being then comparable to that of a medium-type jute.—E.B.O.

# OIL CROPS

## SESAME

1452 Mazzani, B. and González, O. Resultados de experimentos preliminares con ácido giberélico en ajonjolí, caraota, tomate y lechosa. [**Results from preliminary trials with gibberellic acid on sesame, beans, tomato and papaw.**] *Agron. trop., Maracay* 1958, **7,** No. 4, 175–89, bibl. 5, illus., English summary.

Seed treatment of sesame with gibberellic acid at 10–500 ppm. for 2–24 hr. had no effect on germination, but seedling growth was accelerated and seedling height increased proportionately to the concentration used. Treatment of the plants with these same concentrations increased the length of the internodes and the height of the plants. It is thought that gibberellic acid could be of practical value for treating sesame seed in that it accelerates the initial growth of the plants and thus enables them to compete effectively with weeds.—E.B.O.

1453 Nakamura, H. and Sato, T. [**Histological research on the dehiscence mechanism of the capsule in sesame.**] [Japanese] *Sci. Rep. Hyogo Univ. Agric.* 1957, **3,** No. 1, 26–9, bibl. 5, illus., French summary.

In a dehiscent and non-dehiscent variety of sesame, the development of the embryo and fruit wall were studied during the 40 days following flower-opening. At the end of this period the seeds were ready for harvesting. The histological changes involved in the dehiscence mechanism were investigated ; they were assumed to be governed by the genetically determined presence of an anti-auxin which prevented enlargement of cells of the capsule wall in the region of the suture. F Fr. s.—D.B.

## OIL-SEED FLAX

*See also Abs. 1447, 1483, 1496.*

1454 Sackston, W. E. **Control of weeds in late sown flax plots with MCPA and TCA.**

*Weeds* 1958, **6**, No. 4, 399–405, bibl. 2, illus. [Inst. Fitotecnico y Semillero Nacional, La Estanzuela, Dep. Colonia, Uruguay]

In trials in Uruguay, oil-seed flax 4–6 in. tall was treated with : (a) TCA at 5·8 lb. a.e./ac., (b) MCPA at 3 oz. a.e./ac., or (c) TCA at 5·8 lb. + MCPA at 3 oz. a.e./ac. in 35 gal. spray-volume. Mean seed yields of crops untreated, or treated with (a), (b) or (c) were 465, 512, 567 and 620 lb./ ac., respectively. TCA gave good control of *Digitaria sanguinalis* and some control of *Polygonum aviculare*. MCPA was moderately effective against *P. aviculare*. Total weed weights per plot were markedly reduced by treatment (c).—P.J.B.

## SAFFLOWER

1455 Soroa, P. J. M. El alazor, un olvidado cultivo que puede restaurarse. [**Safflower, a forgotten crop which can be restored.**] *Agricultura, Madr.* 1959, **28**, No. 322, 62–5, illus.

Information is given on safflower (*Carthamus tinctorius*), and its cultivation.—E.B.O.

1456 Horowitz, B. and Kleinig, C. R. **Safflower trials in Australia.** *Tech. Paper 11 Div. Pl. Industr. C.S.I.R.O.* 1958, pp. 19, bibl. 29.

Safflower (*Carthamus tinctorius*) was tested in a number of regions throughout Australia and gave promising results at Biloela, on the Darling Downs, and in N.W. New South Wales. In southern Australia existing varieties were unsatisfactory, while in northern Australia it is difficult to see the place of the crop at this stage. Safflower culture is similar to that of wheat, which it could replace in farming rotations in S. Queensland and N.W. New South Wales. In these regions the crop is susceptible to aphid attack, to frost in the seedling and vegetative stages and to excessive moisture during the growth period, but it is considered that higher yielding varieties and better agronomic practices should overcome these difficulties. On economic grounds it appears desirable to produce safflower in Australia, mainly for paint manufacture. F. s.—A.M.H.

## SUNFLOWER

*See also Abs. 1476, 1483.*

1457 Sivokonev, A. N. [**The effect of sowing date on sunflower yield.**] [Russian] *Zemledelie (Agriculture, USSR)* 1959, **7**, No. 2, 53–6. [Kamensk State Agric. Exp. Sta.]

*Helianthus annuus* is an important oil crop in the northern part of the Rostov Province where sowing date is a primary factor determining yields. At the above Station [approx. 48° N. lat., 40°E. long.] during 1956–8 tests were made (4 replications) on 600–1800 sq. m. plots with the variety VN11MK 6540 to determine the best sowing date. Precipitation in this region is 360 mm. p.a., of which the greater part falls in summer/autumn ; there is therefore a deficiency of moisture for spring-sown crops. Under the cultural conditions described (which included sowing on the square-pocket system, 70 × 90 cm., and tilling the ground once for sowings on 14 April, twice for sowings on 24 April and 4 May, and three times for sowings on 14 May, in order to eliminate weeds) the number of days from sowings on 14 April to seed ripening was 128 ; from sowing on 24 April, 125 days ; from sowing on 4 May, 119 days, and from sowing on 14 May, 114 days. Seed yields ranged from 1320 kg./ha. from sowings on 14 April to 1920 kg./ha. from sowings on 14 May.—M.H.

1458 Wallace, R. H. and Habermann, Helen M. **Absence of seed dormancy in a white mutant strain of *Helianthus annuus* L.** *Pl. Physiol.* 1958, **33**, No. 4, 252–4, bibl. 14. [Bot. Dep., Univ. Connecticut, Storrs and Res. Inst. (Fels Fund), Univ. Chicago, Illinois]

## RAPE AND TURNIP-RAPE

1459 Torssell, B. Metoder och möjligheter till förbättring av höstoljeväxternas överwintring. [**Methods and possibilities for improving the overwintering of autumn-sown oil-seed crops.**] *Svensk Frötidn.* 1958, **27**, No. 4, 43–7. [Crop Husbandry Inst., Roy. Agric. Coll., Uppsala, Sweden]

In Sweden, most of the home-produced vegetable oil is derived from winter rape [*Brassica napus* var. *oleifera* subvar. *biennis*], and winter turnip-rape [*B. campestris* var. *oleifera* subvar. *biennis*], both of which tend to overwinter badly. Their lack of winterhardiness is both physiological in nature and, especially in the case of winter rape, due to their morphology and growth habit. Ways of improving the winterhardiness of these crops are discussed and include breeding for improved characteristics and the following cultural measures: sowing in furrows, sowing in hills and, in the case of winter rape, sowing and spacing the plants widely apart, in order to restrict stem elongation. [See also *Fld Crop Abstr.* 10: 252, 253 and 691 ; 11 : 756.]—G.M.R.

1460 Andersson, G. Svalöfs original Arlo Varrybs. **Svalöf's Arlo summer turnip rape.** *Sverig. Utsädesfören. Tidskr.* 1958, **68**, No. 3, 196–9, illus., English summary.

Svalöf's Gute, released in 1951, gave seed- and oil-yields more than 10% higher than those of other varieties of summer turnip-rape [*Brassica campestris* var. *oleifera* subvar. *annua*]. In 52 trials

during 1950–6, Arlo gave 3% higher seed yields and 5% higher oil yields than Gute. Arlo yielded an average of 400 kg. oil/ha. and had an oil content in the seed of 41·4%. Arlo is morphologically identical to Gute and is similar in time of ripening and resistance to lodging.—G.M.R.

1461 Andersson, G. and others. Zur Nährstoffaufnahme des Winterraps. [**Nutrient uptake by winter rape.**] *Z. Acker- u. PflBau* 1958, **107**, No. 2, 171–9, bibl. 12, English summary. [Schwedische Saatzuchtanst., Svalöf]

In trials at 3 locations in Sweden, the quantities of N, P, K, Ca and Mg found in winter rape [*Brassica napus* var. *oleifera* subvar. *biennis*] at 5 growth stages and in ripe seeds were tabulated. The maximum average quantity of K was found during flowering, and of N, P, Ca and Mg, shortly after flowering. The seed crop of 4000 kg./ha. (at 15% moisture content) contained, in kg./ha : N, 134 ; $P_2O_5$, 54 ; $K_2O$, 72 ; CaO, 18 and MgO, 6.—D.B.

## MUSTARD

1462 Winfield, A. L. and Gough, H. C. **Pests of mustard seed crops.** *Agriculture, Lond.* 1959, **65**, No. 11, 554–8, illus. [N.A.A.S., Cambridge]

In trials in 1958 on Trowse mustard (*Brassica juncea*) [see *Fld Crop Abstr.* 6 : 842], the effects of dieldrin, parathion, γ-BHC and DDT on infestation by pollen beetle (*Meligethes* sp.) and seed weevil (*Ceuthorhynchus assimilis*) were studied. All treatments gave significantly higher yields than the control. γ-BHC (1 pt. 20%/ac.) and DDT (3 pt. 25%/ac.) were the most effective in reducing the number of blind stalks caused by pollen beetle attack and dieldrin (2 pt. 15%/ac.) gave the best results against seed weevil, but none of the treatments gave complete control. The recommended stage for spraying is before flowering, when the plants are 12–14 in. high. Dressing the seed with 2 oz. 80% γ-BHC per lb. reduced infestation with stem weevil (*C. quadridens*) from 78 to 41%.—A.M.H.

## POPPY

1463 Danert, S. Zur Systematik von *Papaver somniferum* L. [**A contribution towards the systematics of *Papaver somniferum* L.**] *Kulturpflanze* 1958, **6**, 61–88, bibl. 28, illus. [Inst. Kulturpflanzen forsch. Gatersleben, Krs. Aschersleben, E. Germany]

An illustrated account is given of the characters by which varieties of *P. somniferum* are distinguished, viz. stigma lobes, seed colour, flower colour and capsule dehiscence. There is an identification key to 52 varieties, each of which is briefly described.—D.B.

# CROP BOTANY

## PHYSIOLOGY

1464 Todd, G. W. **Effect of ozone and ozonated 1-hexene on respiration and photosynthesis of leaves.** *Pl. Physiol.* 1958, **33**, No. 6, 416–20, bibl. 9. [Univ. California Citrus Exp. Sta., Riverside, California]

The possibility that concentrations of ozonated 1-hexene or ozone, insufficient to produce visible damage, might affect the rates of photosynthesis or respiration in leaves of Pinto bean [*Vicia faba* var.] was investigated. Both gases increased respiration rate up to 4 times that of untreated control leaves, and decreased the rate of photosynthesis. There was no stimulation of respiration or inhibition of photosynthesis until visible injury developed. The R.Q. of treated bean leaves was the same as that of the controls.—A.M.H.

1465† Odumanova, G. A. [**The relationship between photosynthesis and photoperiodism in plants.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1959, **124**, No. 3, 711–14, bibl. 6, illus. [All-Union Inst. Pl. Prot.]

Various authors have found a close relationship between photoperiodism and photosynthesis and where $CO_2$ supplies to the plants are excluded, the photoperiodic reaction is inhibited. [See also *Herb. Abstr.* 11 : 450.] The data hitherto recorded refer only to short-day plants. The author's work is concerned with this phenomenon in experiments with *Brassica crenata* and *Perilla ocymoides*. Under conditions of the test, there is evidence that : (1) if the leaves of these plants are placed in an atmosphere deprived of $CO_2$, the plants remain in the vegetative state although light conditions are optimal for their reproductive development ; (2) for the normal photoperiodic reaction it is necessary for the leaves receiving the photoperiodic impulse to continue photosynthesis simultaneously; (3) this applies equally to long- and short-day plants ; (4) the physiological processes which occur in the leaves under optimal photoperiodic conditions begin with the assimilation of $CO_2$ and

only later do these processes result in the formation of reproductive organs.—M.H.

1466† Fowden, L. **The incorporation of inorganic nitrogen compounds into amino-acids and proteins of plants.** *Advanc. Sci.* 1959, **15**, No. 60, 392–6, bibl. 10. [Univ. London]

1467 Vasil'ev, I. M. and others. [**The effect of Roentgen rays on the content of nitrogenous substances in wheat plants.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1959, **124**, No. 4, 928–9, bibl. 4, illus. [Inst. Biol. Physics, Acad. Sci. USSR]

Wheat plants treated with X-rays accumulate great quantities of sugar. This has been attributed to the fact that plant growth is suppressed by the rays while photosynthesis continues normally. It is postulated that substances other than sugar also accumulate within the plant. The authors confirmed this with regard to N substances (cyclo-amino-acids and nucleotides) in tests in which winter-wheat seedlings absorbed light within the range 240–300 m$\mu$. The seedlings were grown in a luminostat under continuous light at 23±2°C. After 5–6 days following emergence they were irradiated by a RUM-3 apparatus (15 milliamperes 180 kilowatts, without filter) ; a dose of 5000 roentgens [stated in conclusions as 3000 r.] completely suppressed seedling growth. Leaves were analysed immediately after irradiation and also 7, 13 and 18 days after. There was evidence that, under conditions favourable for photosynthesis, a considerable amount of cyclo-amino-acid and nucleotides accumulated in the leaves, the quantity being greater the longer the period after irradiation.—M.H.

1468† Bond, G. **The incidence and importance of biological fixation of nitrogen.** *Advanc. Sci.* 1959, **15**, No. 60, 382–6, bibl. 23. [Univ. Glasgow, Scotland]

The present state of knowledge of the occurrence of the fixation of atmospheric N in the root nodules of non-leguminous plants is reviewed.—P.J.B.

1469† Leaf, G. **Biochemical aspects of nitrogen fixation.** *Advanc. Sci.* 1959, **15**, No. 60, 386–92, bibl. 14. [Univ. Glasgow, Scotland]

Biochemical mechanisms in the process of the fixation of atmospheric nitrogen are discussed with particular reference to the mechanisms of fixation in the root nodules of the non-leguminous plants *Alnus glutinosa* and *Myrica gale*.—P.J.B.

1470 Krotkov, G. and others. **Effect of light on the $CO_2$ absorption and evolution by *Kalanchoë*, wheat and pea leaves.** *Pl. Physiol.* 1958, **33**, No. 4, 289–92, bibl. 12. [Dep. Biol., Queen's Univ., Kingston, Ontario and Biol. Labs, Harvard Univ., Cambridge, Mass.]

Detached wheat and pea leaves were placed in glass chambers containing known amounts of $^{14}CO_2$, and were kept in darkness or light for 1 hr. The residual $^{14}CO_2$ was then removed and its amount and activity determined, so that the amounts of $^{14}CO_2$ taken up and $^{14}CO_2$ evolved by the leaves could be calculated. In wheat, $CO_2$ uptake was observed both in light and in darkness, while in the pea it could be demonstrated in the light only. Illumination enhanced $CO_2$ evolution in wheat, but reduced it in peas. It is concluded that addition of the amount of $CO_2$ respired in darkness to that absorbed in light will not necessarily produce the value for the true photosynthesis of a leaf. F. s.—A.M.H.

1471† Haber, A. H. and Brassington, Nancy. **Non-respiratory gas released from seeds during moistening.** *Nature, Lond.* 1959, **183**, No. 4661, 619–20, bibl. 6. [Biol. Div., Oak Ridge Nat. Lab., Tennessee]

Under conditions of the tests with different plant material (seeds of various species, dry tea leaves, powdered potato starch), there is evidence that gas (presumably air adsorbed by the tissues) is given off when the dried material, including non-viable seed, is soaked in water. This gas, distinguished from air displacement at atmospheric pressure, may result in high values being mistakenly attributed to the respiratory quotient of imbibed seed. [See also *Fld Crop Abstr.* 6 : 1175.]—M.H.

1472† Philip, J. R. **Osmosis and diffusion in tissue : half-times and internal gradients.** *Pl. Physiol.* 1958, **33**, No. 4, 275–8, bibl. 8. [Div. Biol., California Inst. Technol., Pasadena and Div. Pl. Industr., CSIRO, Australia]

The variation with tissue dimensions of the half-times of osmosis and self-diffusion, the manner in which half-times of individual cells vary with cell position within the tissue and the internal gradients within tissue during such phenomena, are analysed. F. s.—A.M.H.

1473† Philip, J. R. **Propagation of turgor and other properties through cell aggregations.** *Pl. Physiol.* 1958, **33**, No. 4, 271–4, bibl. 7. [Div. Biol., California Inst. Technol., Pasadena and Div. Pl. Industr., CSIRO, Australia]

The problem of the propagation of osmotic disturbances through tissue consisting of an aggregation of osmotic cells is analysed. It is shown that such disturbances can be described mathematically as diffusion phenomena, the diffusivity being a function of the dimensions, permeability

and elastic properties of the individual cell, together with the quantity of osmotically active material in it. The problem of diffusion of isotopically labelled water through such tissue may be treated similarly. The diffusion coefficients of the two phenomena depend on different properties of the system. The experimental result that they are of about the same order of magnitude is, apparently, a coincidence and does not substantiate the idea that diffusion studies of labelled water can give information directly connected with cell water-relations. F. s.—A.M.H.

1474† Philip, J. R. **The osmotic cell, solute diffusibility, and the plant water economy.** *Pl. Physiol.* 1958, **33**, No. 4, 264–71, bibl. 27. [Div. Biol., California Inst. Technol., Pasadena and Div. Pl. Industr., CSIRO, Australia]

The dynamic theory of the classical osmotic plant cell is developed in quantitative form and extended to the case where a diffusible solute is present. It is shown that solute diffusibility may result in marked deviations from classical behaviour. Where Donnan membrane phenomena are operative, the analysis needs modification, but the gross character of the dynamic behaviour remains similar. The " physiological drought " theory of the influence of soluble salts in the soil on the water economy of plants depends on their non-diffusibility. Walter [see *Fld Crop Abstr.* 8 : 1530] states that the osmotic effect is balanced by the intake of salts. Neither view seems wholly correct, since both solute diffusibility and liquid phase continuity may be important factors. F. s.—A.M.H.

1475 Van Steveninck, R. F. M. **Factors affecting the abscission of reproductive organs in yellow lupins (*Lupinus luteus* L.). 2. The effects of growth substances, defoliation, and removal of lateral growth.** *J. exp. Bot.* 1958, **9**, No. 27, 372–83, bibl. 16. [D.S.I.R., Christchurch, N.Z.]

[See also *Fld Crop Abstr.* 11 : 627.] Various theories on the factors affecting abscission are considered in the light of the author's study of : (1) the effects of removing flowers and applying lanolin preparations to the pedicels ; and (2) defoliation and the application of growth-substance preparations to the surfaces from which lateral buds are removed. It is concluded that some unknown abscission-inducing substance is involved since the effect of flower abscission was not directly related to a shortage of assimilates in the plant.—M.H.

## GROWTH AND REPRODUCTION

1476† Blackman, G. E. and Black, J. N. **Physiological and ecological studies in the analysis of plant environment. 11. A further assessment of the influence of shading on the growth of different species in the vegetative phase.** *Ann. Bot., Lond.* 1959, **23**, No. 89, 51–63, bibl. 9. [Dep. Agric., Oxford]

[See also *Ann. bot., Lond.* 1954, 18, p. 71]. In a further analysis of the effects of varying light intensity on growth and development in the vegetative phase, the reactions of 13 herbaceous species have been recorded. In some experiments the degree of shading has been extended to 0·055 daylight, a level near or below the compensation point. For *Lathyrus maritimus*, *Trifolium pratense* and *Vicia faba*, the net assimilation rate is directly related to the logarithm of the light intensity, but for *Helianthus annuus*, *T. repens*, *T. hybridum*, *Medicago sativa*, *Phaseolus multiflorus*, and *Lolium multiflorum* the relationship, though curvilinear, is not logarithmic. It is concluded that for all species the assimilation rate of unshaded plants was limited by light even though in high summer the recorded light energy between 4000–7000 Å averaged 1900–2200 foot-candles. Under light intensities in the range between full daylight and 0·12 daylight, the leaf-area ratio for all these species rises as the intensity decreases and, in general, the trend is logarithmic. When the degree of shading is increased to 0·055 daylight the logarithmic relationship still holds for *L. maritimus* and *V. faba* though this level is below the compensation point. For other species, such as *Ph. multiflorus* and *H. annuus* the trend may be reversed at intensities below 0·12 daylight, and the leaf-area ratio then falls. When the light intensity is reduced from daylight to 0·5 daylight, for the species already cited the relative growth-rate is invariably depressed. At 0·055 daylight the relative growth-rate never exceeded 1% per day. The ecological and physiological implications of these findings are discussed. F. s.—M.H.

1477† Blackman, G. E. and Black, J. N. **Physiological and ecological studies in the analysis of plant environment. 12. The role of the light factor in limiting growth.** *Ann. Bot., Lond.* 1959, **23**, No. 89, 131–45, bibl. 53. [Dep. Agric., Oxford]

Previous investigations in southern England on 22 herbaceous species have demonstrated that for widely spaced plants the diurnal solar radiation limits the net assimilation rate of all species and restricts the relative growth rate of many. In examining how far these limitations apply to other environments, it is now shown that in the subtropics and tropics, the levels of net assimilation rate and relative growth rate can greatly exceed those so far recorded for cool temperate regions, and these differences are attributed to the higher insolation and temperatures. From a variety of

evidence it is concluded that as the distance between plants is reduced, so the net assimilation rate is progressively diminished, even in regions of high insolation, through the enhanced mutual shading. In consequence, levels of light which may be supra-optimal for relatively isolated individuals may yet limit the dry-matter production of a dense population. There is an optimal ratio of leaf area to ground surface (leaf-area index) for the maximal exploitation of the incoming radiation in terms of carbon fixation by the population and this optimum will vary with the species and the light intensity. Where other environmental factors are favourable, light may limit dry-matter production everywhere. On an annual basis, dry-matter production will be dependent on two components, namely : the length of the ' growing season ' and the period over which the leaf-area index remains optimal. In the tropics the highest annual rate of production so far recorded is 78 tonnes/ha., produced by *Saccharum officinarum*, and in north-east Europe, 23·5 tonnes by *Fagus sylvatica*. Over short periods the rate of dry-matter production can attain 38 g./m.²/day and the utilization of total solar energy can be as high as 4·2 %, or 9·5% for light in the range 4000–7000 Å. Although information on the productivity of natural communities is still scanty, an attempt has been made to interpret the general pattern in terms of the length of the growing season, the level of solar radiation, the magnitude of the leaf-area index of the whole community, and the period over which the leaf canopy remains green. It is postulated that in any region the vegetation reaches a dynamic equilibrium when there is the maximum exploitation of the incoming radiation to give the greatest production of dry matter. F. S.—M.H.

1478† Voskresenskaja, N. P. and Grišina, G. S. **[The effect of the intensity and spectral composition of radiation on plant metabolism and yields.]** [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1959, **124**, No. 2, 469–72, bibl. 11. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The object of this work was to elucidate the effect on plant metabolism and yields (especially of N substances) of blue and red radiations, also the effect of differences in intensity of these radiations. The study was made with *Phaseolus vulgaris* var. Triumph (which is neutral in its photoperiodic reaction) grown in compost cultures in a ventilated dark room containing 30-watt lamps, of red light (range 520–710 millimicrons) and of blue light (400–660 mμ). The room was divided into 2 compartments, one for the red lamps and one for the blue, and the compartments into 3 sections with light intensity (of $10^3$ erg/cm.²/sec.) ranging from 23 to 40 and 55 units (red), and from 30 to 48 and 73 (blue), achieved by placing the lamps at different heights in the sections. The temperature in the sections was maintained at 21–22°C. Seedlings emerged simultaneously in red and blue light, and growth was better with high intensity of light. Blue light retarded elongation [growth in height] of the plants. A lower light intensity in both red and blue encouraged plant elongation and lowered plant weight. Dry weight (18-day plants) of the above ground mass in red light was greatest at $45 \cdot 10^3$ erg/cm.²/sec. and did not change with increase in light intensity. In blue light, dry wt. increased to a maximum at 70 units of intensity, beyond which observations were not made. Flower-bud formation began simultaneously under red and blue light, 12 days after seedling emergence. After a further 7 days mass flowering was observed in high light intensities of both red and blue. With a lowering of intensity the onset of flowering was delayed, the number of flowers was less, and the flowering period was prolonged. Thus, the date and the duration of flowering are affected by light intensity. The data also show that spectral composition of the light determines developmental processes in plants, flowering being more abundant and seed yield greater in blue than in red light, at all intensities. In weak light, seed yield was almost 4 times greater in blue than in red while in strong light yield was about 30% more in blue than in red. It is therefore concluded that the extent of the effect of short-wave radiation on seed yield is determined by light intensity. The study was also designed to elucidate the metabolism of total- and protein-N and the activity of cytochromoxidase. There was indication that the content of protein-N in seed produced in blue light is somewhat lower than that produced in red, at all intensities. The data also showed that : (1) N content in leaves was higher in blue light than in red, although with increased intensity in both red and blue radiation, the amount of total-N was somewhat lowered ; (2) the greater capacity of leaves in blue light (compared with those in red light) to accumulate protein accelerated the formation of pods and raised the total harvest, without, however, improving the protein content of the grain ; (3) the activity of the cytochrome system was greater in leaves grown in blue light compared with red; this is attributed to the slowness of the photochemical reaction in blue light ; (4) the activity of the cytochrome system was scarcely altered with change in light intensity ; the reaction was satiated at $30 \cdot 10^3$/cm.² /sec. and to increase the activity of the system, the determining factor is spectral composition and not light intensity. The ecological significance of these observations is discussed, notably the " filtered" light which characterizes the lower levels in dense sowings.—M.H.

1479† Visser, W. C. **Crop growth and availability of moisture.** *J. Sci. Fd Agric.* 1959,

**10**, No. 1, 1–11, bibl. 14. [Inst. Ld and Water Mgmt Res., Wageningen, Netherlands]

The relationships between crop growth and ground-water levels, water tension and evaporation, and the availability of water as influenced by the physical condition of the soil, are discussed with special reference to work done in the Netherlands.—A.M.H.

1480† Dreibelbis, F. R. and Harrold, L. L. **Water-use efficiency of corn, wheat and meadow crops.** *Agron. J.* 1958, **50**, No. 9, 500–3. [Ohio Agric. Exp. Sta., Wooster]

The efficiency of water utilization, on 2 silt-loam soils under a rotation of maize, wheat and hay crops, was determined during 1943–56 using lysimeter techniques. During the experimental period the greatest efficiency for each of these crops was 831, 494, and 524 lb. dry matter/in. of water, respectively. Water-use efficiency values for the hay crops [species composition not stated] varied between 524 and 160 lb./in. on Muskingum loam and between 492 and 146 lb./in. on Keene loam. There was a positive linear correlation between hay yield and water-use efficiency, irrespective of soil type. The maximum water-use efficiency for unirrigated maize and wheat was obtained with 15 in. of rainfall during May-Sept. and 11 in. of rainfall during April-June, respectively. Irrigated maize in 1953 and irrigated meadow in 1955 had a higher water-use efficiency (831 lb./in. and 661 lb./in.) than had these crops when unirrigated.—R.B.

1481† Škol'nik, M. Ja. and others. [**The physiological characteristics of different types of maize and clover under varied conditions of water supply and the effect of P, B and Cu under these conditions.**] [Russian] *Trudy Bot. V.L. Komarova* (*Trudy Inst. bot., Acad. Sci. USSR*) 1958, Ser. 4, Exp. Bot., 95–119, bibl. 46.

It has been claimed that change in plant form induced by varying growth conditions during the light phase is characteristic of a labile heredity within the plant. There is no previous published information on the physiological peculiarities of the new plant types produced by this means. This aspect was studied by the authors during 1953 in the light of: (a) Michurin's postulate (1948) that plants with a labile heredity can easily acquire a high degree of winterhardiness; and (b) Lysenko's claim (1948) that spring wheats which are in an unstable condition of transformation to winter types can more easily adapt themselves to low winter temperatures than can true winter types. This study was made (3 replications) with two forms of *Zea mays* and two of *Trifolium pratense*, namely, the original varieties and the forms obtained from them by the following specific treatments during phasic development: (a) maize seed, maintained when seed-coat is splitting for 21 days at 0–1°C., then for 9 days at 15–20°C., after which the seedlings were placed under short daylengths for 19 days; (b) clover seedlings maintained for 45 days at 15–20°C. during the day and 0–2°C. at night. Under cultural treatments, which included applying different fertilizers and minor elements, there was evidence that the modified form of maize differed from the original form in having greater seedling vigour, more rapid growth, greater content of anthocyanin (especially in the roots), and increased iodine-reduction activity (under normal and reduced water supplies). The modified types are more robust than the originals and have greater resistance to drought. Similar results were obtained with clover. Compared with the original form, P, Cu and B had a more beneficial effect on growth, development, iodine-reduction activity and content of ascorbic acid of the modified forms of maize and clover, and on carbohydrate metabolism in the modified form of maize, especially under conditions of drought.—M.H.

1482 Armiger, W. H. and Fried, M. **Effect of pot size and shape on yield and phosphorus uptake of millet.** *Agron. J.* 1958, **50**, No. 8, 462–5. [Soil and Water Cons. Res. Div., Agric. Res. Serv., U.S. Dep. Agric., Beltsville, Maryland]

In glasshouse tests on German millet [*Setaria italica*] grown in containers with capacities ranging from 60 to 800 cu. in., small containers produced the greatest yields of oven-dried plant material, and the greatest P-uptake, when yields and P-uptake were determined on the basis of the ratio of plant population to weight of soil. A flat type 2-gal. pot (large ratio of surface area to soil volume) gave consistently greater yields than the conventional type of 2-gal. pot, though plant population and weight of soil were identical. Plant growth response to the various containers showed a marked consistency at all harvest intervals using 3 types of soil. Small containers gave comparable yields and P-uptake per unit weight of soil. F. s.—R.B.

1483 Duncan, W. G. **Effects of plant population and of fertilizer placement on plant growth and development.** *Diss. Abstr.* 1959, **19**, No. 7, 1500–1. [Purdue Univ., Lafayette, Indiana]

Maize could be distinguished from a number of other crops including soyabeans, cotton, sorghum, wheat, oats, barley, potatoes, oil-seed flax and sunflowers, in that the logarithm of the yield per plant in maize was linearly related to the plant population; in the other crops, the log. of the yield per plant was linearly related to the log. of the plant population. The following equation was

evolved to express the yield of maize per unit of area, in terms of population per unit of area : $Y = PK10^{(bP)}$, where Y = yield per unit of area, P = population per unit of area and K and b are constants. The equation that would indicate the population which would give maximum yields was $P\ max = -(1/2{\cdot}3b)$. For other crops the following equation expressed the yield per unit of area, in terms of population per unit of area : $Y = KP^{(1-bP)}$ ; for these crops, there was no plant population that would give the maximum yield. Equations derived to give yields in terms both of plant population and nutrients indicated that the Mitscherlich-Spillman equation could not accurately describe the effect of any given nutrient on yield if that nutrient affected the value of the constant b, given above. It was considered that these equations relating population to yield might also be of value for computing the relationship of other plant characters to yields. The difference between maize and the other crops studied was presumed to be caused by the relatively inflexible leaf area of maize, compared with the other crops ; high plant populations would reduce the light intensity per unit of leaf area, whereas the other crops showed much less variation in leaf-area index as plant populations changed. Observations are made on the effect of different factors, including fertilizer placement, which affected the uptake of P and N by maize. Maize and soyabean roots were shown to have only feeble power to penetrate barriers such as moist filter paper in soil. It was concluded from direct observations that the root cap plays a more important role in the growth of roots through the soil than is generally recognized.—P.J.B.

1484† Wadsworth, R. M. **An optimum wind speed for plant growth.** *Ann. Bot., Lond.* 1959, **23**, No. 89, 195–9, bibl. 11. [Bot. Dep., Univ. Reading]

Observations on the growth-rate of stands of young plants of *Brassica napus* in a wind tunnel show that relative growth-rate rises with wind speed at low wind speeds but falls again when wind speed is further increased. A wind speed of 0·3m./sec. caused optimal growth in these experiments. Changes in relative growth-rate were small. F. s.—M.H.

## GROWTH SUBSTANCES

1485† Brian, P. W. **Effects of gibberellins on plant growth and development.** *Biol. Rev.* 1959, **34**, No. 1, 37–84, bibl. 215. [Akers Res. Lab., ICI Ltd., Welwyn, Herts]

The subject is reviewed from the following aspects : chemical and physiological relationships of gibberellins ; the effects and the mode of action of gibberellins on vegetative growth and on flowering ; natural gibberellin-like hormones, and their role in the regulation of growth and flowering.—M.H.

1486† Galston, A. W. **Gibberellins and nodulation.** *Nature, Lond.* 1959, **183**, No. 4660, 545, bibl. 2. [Bot. Dep., Yale Univ., New Haven, Conn.]

The work of Fletcher and others (*Nature, Lond.* 1958, 182, 1319) showed that, under conditions of their tests, gibberellins had no effect on the nodulation of *Trifolium repens*. This conflicts with the results reported by Thurber and others (*Nature, Lond.* 1958, 181, 1082) and with subsequent findings, details of which are to be published later. The author suggests that differences in nodulation response in leguminous plants are probably related to the fact that different genotypes of plants (with varying endogenous gibberellin levels) react differently to identical gibberellin applications.—M.H.

1487† Kolbe, W. Zur Frage der Anwendung der Gibberelline im praktischen Pflanzenbau. [**The application of gibberellins in crop cultivation.**] *Z. Acker- u. PflBau* 1958, **107**, No. 2, 147–70, bibl. 76, English summary.

This is a literature review of (a) the history of the development of gibberellin in Japan (briefly) and (b) current work, chiefly in the USA and Great Britain, on gibberellic acid. Aspects discussed include the chemistry, toxicity, and manner of applying gibberellic acid, its application to crop cultivation, its effect on resistance to disease organisms in plants, and the chlorosis which GA causes.—D.B.

1488† Plant Protection, Ltd. **Technical data sheet. Gibberellic acid.** 1958, pp. 16, bibl. 28. **Experimental results, agricultural crops.** Pp. 12, bibl. 42. **Experimental results, miscellaneous uses.** Pp. 7, bibl. 27. Plant Protection, Ltd, Fernhurst Res. Sta., nr Haslemere, Surrey. [Received Jan., 1959]

This publication contains brief accounts of the discovery of gibberellic acid, its physical, chemical and biological properties, suitable rates and methods of application and suggested experimental uses. The section on results obtained with agricultural crops deals with a variety of cereals, root-, fibre- and oil-crops, legumes and pasture grasses. The section on miscellaneous uses includes notes on the use of GA for control of certain weeds.—A.M.H.

1489 Petersen, H. I. **Translocation of $^{14}$C-labelled 2, 4 - dichlorophenoxyacetic acid in barley and oats.** *Nature, Lond.* 1958, **182**, No. 4650, 1685–6, bibl. 1, illus. [State Weed Res. Sta., Lystoftegaard, Skovlunde, Denmark]

MCPA and 2,4-D produce deformities in the straw and spikes of cereal plants when applied

before 5 or 6 leaves have developed. The author's tests show that there is only slight translocation of these preparations from the leaves to other parts of the plants at the 5- or 6-leaf stage. It is postulated that, contrary to the assumption that these deformities in young plants result solely from the primordia being particularly sensitive to hormone compounds, this lack of translocation, and not an increased resistance, may be the reason why older plants are not so affected.—M.H.

1490 Beek, L. C. V. **Effect of 2,3,6-trichlorobenzoic acid and 2,6-dichlorobenzoic acid on the geotropic and phototropic responses of seedlings of various species.** *Pl. Physiol.* 1959, **34,** No. 1, 61–5, bibl. 10. [Dep. Bot., Univ. Michigan, Ann Arbor]

Shoots of oats, barley and other seedlings, which were grown in the dark in dilute solutions of 2,3,6-trichlorobenzoic acid [2,3,6-TBA] or 2,6-dichlorobenzoic acid, failed to assume the normal vertical poisition. This was assumed to be due to repression of the geotropic response. There was a quantitative relationship between the concentration of the acids and the extent of repression of the geotropic response of oat shoots. 2,3,5-triiodobenzoic acid was also capable of interfering with the geotropic response, but 2,4-D was not. The phototropic response of seedlings of a number of species was also impaired when they were treated with the benzoic acid derivatives. F. s.—A.M.H.

1491 Munakata, K. and Nakai, A. **Absorption and translocation of 2-$I^{131}$-2,3,5-triiodobenzoic acid.** *J. agric. fd Chem.* 1959, **7,** No. 3, 176–8, bibl. 7, illus. [Fac. Agric., Nagoya Univ., Anjo-City, Japan]

With barley plants, TIBA, applied to the roots, was readily absorbed and translocated throughout the plant within 12–24 hr.—E.B.O.

## NUTRITION

*See also Abs. 1635.*

1492† Riley, W. F. **Certain factors affecting the uptake of phosphorus, calcium and strontium by three test crops.** *Diss. Abstr.* 1959, **19,** No. 7, 1493. [Univ. Arizona, Tucson]

The results are given of trials to study the effect of adding straw to 3 calcareous soils on the uptake of P and Ca by barley, wheat and lucerne and on the effect of different contents of exchangeable Ca in the soils on the uptake of Sr by these crops.—P.J.B.

1493 DeMent, J. D. and others. **A method for measuring short-term nutrient absorption by plants. 2. Potassium.** *Proc. Soil Sci. Soc. Amer.* 1959, **23,** No. 1, 47–50, bibl. 3 in text. [Div. Agric. Relations, Tennessee Valley Authority, Wilson Dam, Alabama]

In oats and maize, very high positive correlations were found between the K-uptake by plant tops and by whole plants, over a wide range of soils, absorption periods, and rates of K application. It was concluded that the K content of the tops of these spp. was a suitable criterion for assessing the effects of experimental treatments on K nutrition. [See also *Fld Crop Abstr.* 11 : 822.] F. s.—R.B.

1494 Stapel, C. Sekundære virkninger af kaliummangel. Nogle danske erfaringer. [**Secondary effects of potassium deficiency. Some Danish experiences.**] *Tidsskr. Planteavl* 1958, **62,** No. 3, 522–33, bibl. 24.

The Danish literature is reviewed, with sections on the effects of K deficiency on resistance to drought, cold and frost, on grain quality in cereals, blackening of potato tubers, and on the incidence of fungus diseases and insect pests in crops.—G.M.R.

1495 Skok, J. and McIlrath, W. J. **Distribution of boron in cells of dicotyledonous plants in relation to growth.** *Pl. Physiol.* 1958, **33,** No. 6, 428–31, bibl. 13. [Argonne Nat. Lab., Lemont, Illinois and Dep. Bot., Univ. Chicago, Illinois]

The spp. studied were *Helianthus annuus* var. Mammoth Russian and *Phaseolus aureus*. Boron determinations were made on intracellular fractions separated by differential centrifugation. Mitochondria and "microsomes" were lower in B than nuclei, plastids and dialyzed supernatant fractions. The B content of the non-dialyzable supernatant fraction did not change in response to decreasing amounts of available B accompanied by the appearance of B-deficiency symptoms. The B content of the dialyzable part of the supernatant fraction declined when supplies of available B decreased and reached zero when the plants showed pronounced symptoms of B deficiency. F. s.—A.M.H.

1496† Bottini, E. Il meccanismo di azione degli oligoelementi sulle attività enzimatiche. [**The mechanism of action of minor elements on enzymatic activities.**] *Ann. Sper. agr.* 1958, **12,** No. 5, 1437–48, English summary. [Sta. Chim.-agr. Sper. Torino, Italy]

An account is given of pot trials in which the effect of applying B and Mo to oat and flax plants varied according to the availability of other elements. Information is given to support the belief that minor elements act as catalysts in the enzymatic systems of plants.—E.B.O.

1497 Henkens, C. H. **The trace element manganese : the state of research in the Netherlands.** *Neth. J. agric. Sci.* 1958, **6,**

No. 3, 191–203, bibl. 54. [Inst. Soil Fertility, Groningen, Netherlands]

This is a review of the literature.—R.B.

1498 Wallace, A. [Ed.] **Symposium on the use of metal chelates in plant nutrition.** 1956, pp. 80, bibl. to individual papers, California: National Press, Palo Alto, $1·50. [Received Feb., 1959]

The symposium included papers on : Metal chelates in agriculture ; Effectiveness of iron chelates in the presence of sodium bicarbonate ; Differential availability of micronutrients in the soil following chelate applications, all by A. Wallace ; Chelating agent effects on micronutrient balance in plants, by L. M. Shannon and J. S. Mohl ; Miscellaneous soil and plant chelate studies, by A. Wallace and L. M. Shannon.—A.M.H.

1499 Miura, S. and Kaneki, Y. **Studies on the utilization of metal chelate compounds for crop production. 1. On the growth and yields of barley plants fertilized with Fe- and Mn-E.D.T.A. (ethylenediaminetetraacetic acid).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27,** No. 1, 123–4, bibl. 4, English summary. [Tokyo Agric. Univ.]

## CHEMICAL ANALYSES AND COMPOSITION

1500† Bézanger-Beauquesne, Lucienne. Les alcaloïdes dans les plantes. [**The alkaloids in plants.**] *Bull. Soc. bot. Fr.* 1958, **105,** No. 5–6, 266–91, bibl. 47.

This review is concerned with alkaloids mainly from their botanical aspect. The distribution of different types of alkaloids in various families, genera and species of plants is shown.—E.B.O.

1501† Fowden, L. **New amino acids of plants.** *Biol. Rev.* 1958, **33,** No. 4, 393–441, bibl. 150. [Bot. Dep., Univ. Coll., London]

## TECHNIQUES AND APPARATUS

1502† Browne, D. A. **A semi-automatic seed counter.** *J. agric. Engng Res.* 1959, **4,** No. 1, 72–3, illus. [Grain Dep., Nat. Inst. Agric. Engng, Silsoe, Beds]

In the device described, an electromagnetic register is operated by a switch in the handle of the feeler used for moving the seed from one heap to another, thus enabling the process of counting and sorting to be carried out by a single movement of one hand.—A.M.H.

1503† Cohn, N. S. **A technique for the sterile culture of roots.** *Nature, Lond.* 1959, **183,** No. 4658, 412–3, bibl. 4. [Merganthaler Lab. Biol., Johns Hopkins Univ., Baltimore, Maryland]

1504† Dittmer, H. J. **A method to determine the length of individual roots.** *Bull. Torrey bot. Cl.* 1959, **86,** No. 1, 59–61, bibl. 6, illus. [Univ. New Mexico, Albuquerque]

The approximate total length (L) of an individual root which has broken during removal from the soil is given by the formula $L=L_1d/d\text{-}d_1$, where L is the actual length of the recovered portion of the root, d is the diameter of the root at the base of the plant, and $d_1$ is the diameter of the root at the distal broken end. The formula assumes that roots have an elongated conical structure. The calculated length of roots was shown to be within 10% of the actual length.—R.B.

1505† Waite Agricultural Research Institute. **Investigations in crop physiology.** *Rep. Waite Agric. Res. Inst. 1956-7,* Adelaide, [n.d.], 8–10. [Received Jan., 1959]

Measurement of leaf area, by H. V. Jenkins, p. 10. The apparatus used consists of a perforated plate (600 holes/sq. in.) mounted on an airtight drum, which is connected to a constant-speed suction pump. Leaves are sucked on to the perforated plate and the pressure in the drum decreases in proportion to the leaf area. The method is several times faster than blueprinting the leaves and measuring the area with a planimeter and is said to be as accurate.—A.M.H.

1506† Isaacs, G. W. and Wiant, D. E. **A rapid drying oven for determining the moisture content of crop samples in the field.** *Quart. Bull. Mich. agric. Exp. Sta.* 1959, **41,** No. 3, 600–7, illus.

A drying-oven for crop samples, using tractor exhaust gases mixed with air as a source of heat is described. The samples can be dried in approximately 10 min. The use of a correction factor is recommended where the samples consist of large grains, such as maize, which contain significant quantities of residual moisture after having been dried in the tractor-exhaust oven.—R.B.

1507† Iljin, V. S. (Deceased) Método del hipobromito para la determinación de nitrógeno en las plantas. [**Hypobromite method for determining N in plants.**] *Agron. trop., Maracay* 1958, **7,** No. 4, 191–205, bibl. 8.

1508 Medvedev, Ž. A. [**A rapid assay of the radioactivity of proteins and the proportion of different fractions of radioactive compounds in plant leaves.**] [Russian] *Biohimija (Biochemistry, Leningr.)* 1958, **23,** No. 6, 801–8, bibl. 4, illus., English summary. [Agronom. and Biol. Dep., Timirjazev Agric. Acad., Moscow]

Imprints of the protoplasm of leaves are obtained on weighed pieces of filter paper under pressure. The imprints are washed with trichloracetic acid, acetone and ether, and then reweighed. The specific activity of the residual proteins is computed from the surface radioactivity of the imprints. The method is simple and suitable for quantitative determinations. F. Eng.s.—M.H.

1509† Burriel, M. F. and others. Determinación de boro en suelos y plantas. 1. Método colorimétrico de análisis. [**Boron determination in soils and plants. 1. Colorimetric method of analysis.**] *An. Edafol. Fisiol. veg.* 1958, **17**, No. 6, 565–86, bibl. 87, English summary.

1510† Costes, C. Séparation et dosage des carotenoides foliaires par chromatographie sur cellulose. [**Separation and determination of leaf carotenoids by chromatography on cellulose.**] *Ann. agron., Paris* 1958, **9**, Suppl. 1, 35–48, bibl. 11. [Sta. Cent. Physiol. Vég., Versailles, France]

1511† Juniper, B. E. **The surfaces of plants.** *Endeavour* 1959, **18**, No. 69, 20–5, bibl. 8, illus.

The surface structure of leaves and stems of various spp. was studied by means of electron microscopy of carbon replicas of their surfaces. Spp. studied included *Brassica oleracea* var. *capitata*, *Lupinus albus*, *Chrysanthemum segetum*, and *Pisum sativum*. The effect of light intensity on the surface structure of *P. sativum* is illustrated.—A.M.H.

1512† Semenenko, V. E. [**A receptacle with a neutral optical graded wedge for obtaining light curves of photosynthesis.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol. USSR*) 1957, **4**, No. 5, 476–83, bibl. 10, illus., English summary. [Timirjazev Inst. Pl. Physiol. Acad. Sci. USSR, Moscow] [Received Oct. 1958]

The apparatus, described and illustrated, is used to obtain (during a single 2-min. exposure of the intact leaves) data for plotting the intensity of light energy (in thousand ergs/cm.$^2$/sec.) against intensity of photosynthesis obtained as counts of $^{14}CO_2$ absorbed by the leaf per min., but converted, by a given formula, to mg.$CO_2$/dm.$^2$/hr.—M.H.

1513 Doi, Y. and others. **Studies on the X-ray diagnosis of crop plants. 2. The growth of ears and frost injury of wheat, barley and oats.** [Japanese] *Bull. Fac. Agric. Yamaguti* 1958, No. 9, 997–1000, bibl. 1, illus., English summary.

The soft X-ray apparatus " softex " was useful in observing the effects of short- and long-day treatment on the growth of young ears of wheat, oats and barley. Frost injury was also clearly observed by this method. F. Eng. s.—D.B.

1514† Bosquet, J. Réalisation d'une installation de cultures en solutions coulantes suivant un procédé nouveau. [**A plant-culture apparatus with circulating solutions based on a new process.**] *Ann. agron., Paris* 1958, **9**, Suppl. 1, 15–22, bibl. 5, illus. [Sta. Cent. Physiol. Vég., Versailles, France]

1515† Hudson, J. P. **Use of controlled environments in experimental work.** *Advanc. Sci.* 1959, **15**, No. 60, 425–9, bibl. 5.

A general review is given of the use of controlled environmental conditions in the study of different aspects of plant biology and of the effect of climatic conditions on plants.—P.J.B.

1516† Beament, J. W. L. and Machin, K. E. **Thermostat suitable for controlling air temperature, particularly in biological research.** *J. sci. Instrum.* 1959, **36**, No. 2, 87–9, illus. [A.R.C. Unit of Insect Physiol. and Dep. Zool., Univ. Cambridge]

1517† Stanhill, G. **An irrigation gauge for commercial use in field and glasshouse practice.** *J. agric. Engng Res.* 1958, **3**, No. 4, 292–8, bibl. 10, illus. [Nat. Veg. Res. Sta., Wellesbourne, Warwick]

An instrument which gives a direct reading of soil moisture deficit is described. It consists of a rain gauge and evaporimeter combined in such a way that the amount of water in the instrument at any time corresponds to the amount of water held in the soil. Readings from this instrument were within 0·5 in. of the measured and calculated values of evapotranspiration from irrigated grass. Some theoretical limitations and practical difficulties which might arise in using the instrument to regulate commercial irrigation are discussed.—A.M.H.

1518† Brill, G. D. and Willits, N. A. **Barrel lysimeters for measuring evapotranspiration from crops.** *Agron. J.* 1959, **51**, No. 1, 59–60, illus. [New Jersey Agric. Exp. Sta., New Brunswick]

The construction is described of a simple weighing lysimeter, suitable for measuring evapotranspiration from low-growing, closely-spaced crops.—A.M.H.

## RADIOBIOLOGY

1519 Gailey, F. B. and Tolbert, N. E. **Effect of ionizing radiation on the development of photosynthesis in etiolated wheat leaves.** *Arch. Biochem.* 1958, **76**, No. 1, 188–95, bibl. 7. [Biol. Div., Oak Ridge Nat. Lab., Tennessee]

1520 Zill, L. P. and Tolbert, N. E. **The effect of ionizing and ultra-violet radiations on photosynthesis.** *Arch. Biochem.* 1958, **76,** No. 1, 196–203, bibl. 18. [Biol. Div., Oak Ridge Nat. Lab., Tennessee]

The capacity of *Chlorella* to fix $CO_2$ was destroyed by 5 min. ultraviolet irradiation (35 ergs/sq.mm./sec.). Under the same irradiation, wheat plants retained about 25% of their normal capacity to fix $CO_2$, because part of the radiation was absorbed in the leaf. Sucrose synthesis seemed particularly sensitive to ultraviolet light. The continuation of the normal rate of evolution of $O_2$, despite decreased $CO_2$ fixation after gamma irradiation, suggests that gamma radiation has an independent action on the C cycle and the photolytic system. The inhibition of $CO_2$ fixation was greatest immediately after gamma irradiation. Normal $CO_2$ fixation was restored after a 5 hr. post-irradiation exposure to light. F. s.—e.b.o.

1521† Miroljubov, K. S. [**The effect of radioactive substances on barley plants as dependent on the plants' developmental phase passed in short-day conditions.**] [Russian] *Doklady Akad. Nauk, SSSR* (*Proc. Acad. Sci., USSR*) 1959, **125,** No. 3, 670–2, bibl. 3. [Leningrad Agric. Inst.]

Earlier work by the author [*Zap. Leningr. sel'sk. Inst.* 1956, 11, p. 235] showed that inadequate solar radiation (as under short-day conditions, or on cloudy days) may be compensated to some extent by radioactive irradiation. For example, growth, earing and ripening of barley plants were accelerated if radioactive substances were placed in the soil under the crop, the greatest positive effect being obtained when a short 12-hr. day prevailed throughout the vegetative period. The present work was designed to determine the effect of adding radium chloride ($^{226}$Ra) and shale dust (see Žežel' in *Zap. Leningrad sel'sk. Inst.* 1956, Vol. 11, p. 192) to the soil on growth and phasic development of Viner barley. There was evidence that the addition of radioactive substance resulted in a greater dry-matter yield (20% more than control in natural daylength) and greater weight of grain (15–18% above control) where the plants were held in a 10-hour daylength for 25 days after emergence (period of the photophase). This treatment accelerated the onset of earing.—m.h.

1522† Silow, R. A. **The potential contribution of atomic energy to development in agriculture and related industries.** *Internat. J. appl. Rad. and Isot.* 1958, **3,** No. 4, 257–80, bibl. 28. [FAO, Rome]

1523† Schütz, E. Die Verwendung radioaktiver Stoffe in der landwirtschaftlichen Forschung.[**The use of radioactive substances in agricultural research.**] *Mitt. schweiz. Landw.* 1958, **6,** No. 12, 177–87, illus.

A brief account is given of the nature of radioactivity and the application of radioactive isotopes to soil science, manuring, plant nutrition and plant protection.—d.b.

1524 Moser, F. Y. and Salunkhe, D. K. **Effect of gamma radiation on certain chemical changes in the tubers of the Jerusalem artichoke.** *Proc. Utah Acad. Sci.* 1958, **35,** 168–9. [Abstract] [Utah State Univ., Logan]

Progressive decreases in pectin and crude fibre, pH and percentage of inulin, and progressive increases in fructose, were caused in Jerusalem artichoke tubers by $\gamma$-ray doses of up to $60 \times 10^6$ rep.—r.b.

## MISCELLANEOUS

1525† Wit, C. T. de and Ennik, G. C. Over concurrentie. **On competition.** *Jaarb. Inst. Biol. Scheik. Onderz. LandbGew., Wageningen 1958,* 1958, 59–73, bibl. 11, English summary.

The statistical aspects of experiments on plant competition are described for plants which do, and those which do not, derive benefit from the presence of another sp. It is shown that it is much simpler to carry out one-year experiments, using varying proportions of each species in the experimental population, than to follow the change in composition of a mixture over several years, as the former are not complicated by changes in growing conditions from year to year. Experiments to determine the effect on yield of the distance between rows of crops can be treated as experiments on competition between rows with plants and rows without plants. A linear relationship can be demonstrated between the row spacing and the reciprocal of the yield. F. Eng. s.—r.b.

1526† Ionesco, T. Essai d'estimation de la valeur indicatrice des espèces psammophiles en pays semi-aride (Doukkala-Maroc). [**An attempt to estimate the value of psammophilous species as plant indicators in a semi-arid country (Doukkala, Morocco).**] *Bull. Serv. Carte phytogeog. B* 1958, **3,** No. 1, 7–68, bibl. 11, illus.

The vegetation of the Doukkala is of the semi-arid, Mediterranean-oceanic type. The original vegetation has been destroyed. The present natural vegetation becomes established on fallow after cultivation (mainly of barley, maize and wheat). Most of the region is covered by a sandy layer of varying depth and consistency. The factors which should be considered, when estimating the value of psammophytes are examined. As species taken on their own cannot be considered

as indicators, this study is concerned with plant groups within which the indicator species have a real value. Besides the psammophytes, pelophytes are considered in so far as these 2 types of plants coexist in the same plant groups. It is not sufficient to consider the plant species only in relation to the amount of sand and clay in the soil ; other factors, especially water, must be taken into account. The value of psammophytes as indicators is therefore bound up with all the environment factors concerned. A list is given of species, mostly annuals, which indicate the presence of sand or clay. Some species, such as *Biserrula pelecinus*, *Erodium aethiopicum* and *Juncus bufonius*, which are generally regarded as psammophytes, do not live in deep sand. Some pelophytes, such as *Carlina racemosa* and *Cynara humilis*, can tolerate a superficial layer of sand, but their presence indicates a layer of clay at a depth of 15–20 cm.—E.B.O.

1527 Cufodontis, G. Enumeratio plantarum Aethiopiae. Spermatophyta (Sequentia). [**List of plants of Ethiopia. Spermaphyta (continued).**] *Suppl. Bull. Jard. bot., Brux.* 1959, **29**, No. 1, 533–84.

*Hibiscus* and *Gossypium* spp. are included in this annotated list.—E.B.O.

# WEEDS AND WEED CONTROL

*Where weeds are specific to a crop, see under the crop concerned. See also Abs. 1640.*

1528† Inter-African Phytosanitary Commission. **List of the principal noxious weeds of the world.** *Doc. I.A.P.S.C. (58)14* London, 1958, pp. 44, text in English and French.

The weeds are listed by families. The species in each family are divided into 2 groups, one containing species present in Africa south of Sahara (as well as other countries) and another containing species present in countries outside Africa south of Sahara.—E.B.O.

1529 Bylterud, A. **Control of couch grass (*Agropyron repens* P.B.) with trichloroacetic acid.** *Acta agric. scand.* 1958, **8**, No. 3, 265–78, bibl. 50, illus. [Norwegian Pl. Prot. Inst.]

In trials during 1956–7, 2 series were carried out, the first on cold-hardened rhizomes (taken from a field in Nov.) and the second on rhizomes not cold-hardened. Within each series, the following treatments were applied : (a) no herbicide, not frozen ; (b) TCA at 15 or 30 kg./ha., not frozen ; (c) TCA at 15 or 30 kg./ha., before freezing for 8 weeks ; (d) no herbicide, frozen for 8 weeks ; (e) frozen for 8 weeks, then treated with 15 or 30 kg. TCA/ha. ; (f) frozen for 8 weeks, allowed to grow for 4 weeks, then treated with 15 or 30 kg. TCA/ha. Non-hardened rhizomes in the second trial series were almost completely destroyed by the freezing treatments, while cold-hardened rhizomes survived freezing. The freezing treatments injured cold-hardened rhizomes to some extent and their initial growth after treatment was very slow. In the first series of trials, treating cold-hardened rhizomes with 15 kg. TCA/ha. before freezing resulted in almost compete kill ; similar treatments applied after freezing were less effective, as indicated by sprout numbers at 12 weeks after the treatments ended. Treatment with 30 kg. TCA/ha. prevented all sprout growth for at least 16 weeks. TCA was relatively less effective when applied after the rhizomes had been allowed to grow for 4 weeks. Rates of TCA slightly greater than 15 kg./ha. appeared to be best in practice. The implication of these findings for determining the best time to apply TCA is discussed. It was concluded that early spring treatments were likely to be more effective than autumn treatments. The importance of growing row crops resistant to TCA, and which can effectively shade *A. repens* shoots emerging after TCA treatment, is stressed.—P.J.B.

1530 Johnston, B. G. **Natural and induced dormancy of the vegetative buds on the rhizomes of quackgrass (*Agropyron repens* (L.) Beauv.).** *Diss. Abstr.* 1959, **19**, No. 7, 1505–6. [Univ. Wisconsin, Madison]

1531 Rea, H. E. **Spot-spraying Johnsongrass.** *Bull. 902 Texas Agric. Exp. Sta.* 1958, pp. 14, illus.

Recommendations are made for the application of herbicidal oils, dalapon, TCA and MH as sprays for the control of localized infestations of *Sorghum halepense*. Complete control has been achieved with 20 lb. dalapon plus 40 lb. TCA (as Na salts) per 100 gal. of water.—R.B.

1532 Anderson, O. **Studies on the absorption and translocation of amitrol (3-amino-1,2,4-triazole) by nutgrass (*Cyperus rotundus* L.).** *Weeds* 1958, **6**, No. 4, 370–85, bibl. 22. [U.R.E.M.G., Viçosa, Minas Gerais, Brazil]

Amitrol was translocated more readily within nutgrass plants than was 2,4-D or 2,4,5-T and

tended to accumulate at the growing points, where it exerted its maximum toxic effect.—P.J.B.

1533† Rochecouste, E. **Observations on the chemical control of chiendent (*Cynodon dactylon*) and herbe Mackaye (*Phalaris arundinacea*).** *Rev. agric. suc. Maurice* 1958, **37**, No. 4–6, 259–64, French summary.

Preliminary results of trials in Mauritius indicated that the best control of *C. dactylon* was given by TCA at rates of 100, 150 and 200 lb. per ac., or a mixture of 100 lb. TCA plus 40 lb. dalapon, per ac. ; the best treatment for *Ph. arundinacea* was 100 lb. TCA plus 100 lb. sodium chlorate. The best results were obtained by treating in May, September and October. None of these treatments applied once as a spray controlled the weeds completely.—E.B.O.

1534† Watson, K. A. **Agronomy section. Experiments report. Weed control.** *Rep. Dep. Agric. N. Nigeria Pt 2* **1956-7**, [n.d.], p. 83. [Received Feb., 1959]

Ploughing to a depth of about 8 in. at the end of the rains in Nov., 1955, followed by spring-tine cultivation during the dry season, ploughing to 6–12 in. in April, 1956, and further spring-tine cultivation as required, gave virtually complete control of *Cynodon dactylon*, but the subsequent crops of guinea corn and cotton were patchy, probably because the ploughing was too deep.—A.M.H.

1535 Nilsson, B. Bestämning av flyghavrekärnor med en kemisk metod. **[Detection of wild oat kernels by a chemical method.]** *Svensk Frötidn.* 1958, **27**, No. 5, 56–8, illus.

A description is given of a colorimetric method for distinguishing between the seed of wild oats and that of cultivated or fatuoid oats. The grain is hulled and the kernels soaked for about 20 hr. in distilled water, before being placed for 2·5 hr., dorsal side uppermost, in petri dishes on filter paper moistened with 2 ml. of 2% phenol. Wild oat kernels show a dark brown colour with a violet-tinged lustre. Cultivated oats show a uniform, light brownish-grey colour, with dark colour at the ends, only ; fatuoid oats show a similar, but lighter colour.—P.J.B.

1536† Parsons, W. T. **Furze, an "Old English" weed.** *J. Dep. Agric. Vict.* 1958, **56**, No. 12, 799–803, illus.

Recommended control measures against *Ulex europaeus* are : grubbing or burning, with treatment of regrowth ; spraying with 2,4,5-T (1 part 80% a.e. : 600 parts water), preferably in summer. Treated bushes should not be burnt or cut for 6 months after spraying and any regrowth should be promptly resprayed.—A.M.H.

1537† Meadly, G. R. W. **Weeds of Western Australia. Docks (*Rumex* spp.).** *J. Dep. Agric. W. Aust.* 1958, **7**, No. 6, 621–3, illus.

Isolated dock plants should be grubbed carefully. Seedlings can readily be killed by cultivation, but deep ploughing, followed by one or more subsequent cultivations, is necessary to eradicate mature plants. Under pasture conditions, spot-spraying with 2–4 lb. 2,4-D a.e. in 100 gal. water/ac. is recommended, but is not very effective. In cereal crops, low-volume spraying with 8 oz. 2,4-D a.e./ac. gives quite good control.—A.M.H.

1538 Hattingh, I. D. **Control of sheep sorrel.** *Fmg in S. Afr.* 1959, **34**, No. 11, 44–5, illus. [Coll. Agric., Potchefstroom]

Sheep sorrel [*Rumex acetosella*] can be controlled by winter ploughing after applying fertilizers, harrowing at about 14 days after the first rains to destroy seedlings, and cultivating between the rows as soon as the crop has emerged. The use of hormone weedkillers alone is not recommended. —A.M.H.

1539 Timmons, F. L. and others. **A study of factors which influence effectiveness of amitrol and dalapon on common cattail.** *Weeds* 1958, **6**, No. 4, 406–12, bibl. 12. [Wyoming Agric. Exp. Sta., Laramie]

In trials in north-west Wyoming, treatment of *Typha latifolia* with amitrol or dalapon at rates of 10 lb./ac. on 26 June, followed by 10 lb./ac. on 6 Sept., or 20 lb./ac. on each date, gave virtually complete control during the following season. There was some evidence that a single late-season application of amitrol or dalapon would also give effective control. Adding diesel oil or emulsifiers to the sprays greatly increased the effectiveness of dalapon, but not that of amitrol. Spray volumes between 40 and 320 gal./ac. did not influence the effectiveness of amitrol ; with dalapon, the relationship between spray volume and effectiveness was not clear.—P.J.B.

1540 Shebeski, L. H. and Friesen, G. **Recent developments in chemical weed control.** *Agric. Inst. Rev.* 1959, **14**, No. 1, 26–30, illus. [Univ. Manitoba, Winnipeg]

A weed survey on farms within 60 miles of Winnipeg showed that weeds caused significant crop losses in at least 90% of fields. 2,3,6-TBA and 2,3,5,6-TBA appeared to be suitable for controlling *Cirsium arvense*, *Centaurea repens*, *Convolvulus arvensis* and *Artemisia absinthium*. A mixture of chlorinated benzoic and cresoxyacetic acids killed *Polygonum convolvulus*, *P. persicaria* and *Spergula arvensis*. TCA and dalapon controlled *Setaria viridis* in flax, peas and sugar-beet. Propham is recommended against *A. fatua* in soyabeans, sugar-beet and sunflowers, and CIPC against annual weeds in soyabeans and sunflowers. Neburon showed promise against *P.*

*convolvulus* and *Fagopyrum tataricum* in cereal crops, as did DCU against grass in sugar-beet. CDAA has been used in some areas against *Setaria* spp. and broad-leaved weeds in maize and soyabeans. Amitrol was very effective against *Rhus radicans* and *Typha latifolia*, and also against *Agropyron repens* and *C. arvense*, when treatment was combined with cultivation. A new compound, 4-chloro-2-butynyl-N-3 chlorophenyl carbamate, gave promising results in preliminary post-emergence trials against *A. fatua* in wheat and barley.—R.B.

1541 Khan, M. and Hamid, A. **Weed problems and control of weeds by the use of chemicals.** *Pakistan J. For.* 1957, **7**, No. 3, 216–19. [Agric. Coll., Lyallpur] [Seen Jan., 1959]

The principal weeds of crops in the former Punjab are wild safflower (*Carthamus oxyacantha*) and wild lily (*Asphodelus tenuifolius*). They were effectively controlled by treatment with fernoxone applied at the rate of 1 lb. in about 150 gal. of water [per ac.]. Fernoxone must not be sprayed on wheat within 2 months from sowing.—E.B.O.

1542 Arai, M. and others. **Ecological studies on *Alopecurus aequalis* Sobol. 5. On the influence of light intensity upon growth of the weed, viability of seeds at various stages of maturity, and seed production. 6. On the compost and the methods of field management as agents in seed dissemination.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 1, 129–32, bibl. 8, English summary. [Kanto-Tosan Agric. Exp. Sta.]

*A. aequalis* is a dominant weed in winter crops on drained rice fields. Continuous shading and 80% shading [presumably on a time basis] for a fortnight, about heading time, adversely affected plant growth, seed viability and seed production, the last as a result of fewer ears being formed and late ripening. High temperature of compost reduced seed viability. Seed dissemination is chiefly by shattering of ears in the field. F. Eng. s.—D.B.

1543† Hunziker, A. T. and Caro, J. A. Sobre tres especies adventicias poco conocidas en la República Argentina (*Glaucium corniculatum*, *Euphorbia helioscopia* y *Lycopsis arvensis*). [**Three adventitious species little known in Argentina (*G. corniculatum*, *E. helioscopia* and *L. arvensis*).**] *Rev. argent. Agron.* 1958, **25**, No. 3, 134–41, illus., English summary. [Cát. Bot., Univ. Nac. Córdoba, Argentina]

These species, which are potential weeds in Argentina, are described and illustrated.—E.B.O.

1544† Ivens, G. W. **Effects of arboricides on East African trees and shrubs. 2. Species of the *Brachystegia-Pseudoberlinia* woodland.** *Trop. Agric., Trin.* 1959, **36**, No. 1, 52–64, bibl. 6. [Colonial Pesticides Res. Unit, Arusha, Tanganyika]

Esters of 2,4,5-T, 2,4-D and a mixture of these were applied as sprays to basal bark of trees in *Brachystegia-Pseudoberlinia* woodland (miombo). The trunks were frilled before spraying and responses were observed over a period of nearly 3 yr. The above-ground parts of more than 90% of the trees were killed by 2% 2,4,5-T; 1% 2,4,5-T was slightly less effective. 2,4,5-T was slightly more effective than 2,4-D or the mixture, but the observed differences between chemicals and concentrations were small. Chemical treatments killed a greater number of trees than ring-barking and more effectively prevented regeneration. Water emulsions of 2,4,5-T gave somewhat lower top-kills than oil solutions, but the two were equally effective on *Pseudoberlinia* and *Brachystegia*. In subsequent experiments the water emulsions were ineffective. The results are discussed in relation to the reported ineffectiveness of arboricides against miombo spp. in other parts of Africa and to their practical utilization in Tanganyika. It is concluded that they are most likely to be of value for the selective clearing of bush for tsetse control. F. s.—A.M.H.

1545† Feldman, I. Un arma nueva para combatir al "chañar". [**A new weapon to fight *Geoffraea decorticans*.**] *Rev. Fac. Agron., La Plata* 1957, **33**, No. 2, 167–74, bibl. 5, illus., English summary. [Received Oct., 1958]

Trials were carried out in Argentina to control the shrub *Geoffraea decorticans* by treatment with 2,4-D plus 2,4,5-T. Good control was obtained by spraying these herbicides mixed at a rate of 2271 g. each of a.e. per ha., or by injecting the plants with the pure herbicides at a rate of 273g./ha. each. An apparatus is described for making an incision in the plants and injecting an exact dose of herbicide.—E.B.O.

1546† Racovitza, A. *Carum ajowan* Benth. et Hook., une nouvelle et intéressante plante nourricière de l'*Orobanche ramosa* L. [***Carum ajowan*, a new and interesting host plant for *Orobanche ramosa*.**] *J. Agric. trop. et Bot. appl.* 1958, **5**, No. 6–7, 491–6, bibl. 25.

Investigations were carried out to study measures for controlling *O. ramosa*, using seed of this species collected near Bucarest in 1956. The root secretions of *C. ajowan* stimulated the germination of *O. ramosa* seeds. The parasite then established itself and grew on the roots of *C. ajowan* but did not emerge from the soil, nor did it set seed. It is thought that *C. ajowan* could be used as a trap for controlling *O. ramosa*.—E.B.O.

1547† Gillard, A. Importance de la fleur d'eau et la lutte contre celle-ci. [**Importance of "scum" on water and its control.**] *Rev. Agric., Brux.* 1958, **11**, No. 5, 805–13, illus.

This paper is concerned with the algae which

form a film on the surface of stagnant or slow-flowing water, particularly the species involved and their control.—E.B.O.

1548 ASPINALL, D. and MILTHORPE, F. L. **An analysis of competition between barley and white persicaria. 1. The effects on growth.** *Ann. appl. Biol.* 1959, **47**, No. 1, 156–72, bibl. 18. [Sch. Agric., Univ. Nottingham, Sutton Bonington]

Barley and white persicaria (*Polygonum lapathifolium*) were grown in pure and mixed populations of varying density in sand culture in a glasshouse. The leaf areas and dry weights of leaves, stems and roots were determined at intervals. During vegetative growth the increase in dry matter by barley was unaffected, but tillering was reduced, by competition from dense stands of white persicaria, whereas the growth of white persicaria was reduced by low densities of barley. The decline in leaf area and reduction in root growth of barley with the onset of flowering was accompanied by increased growth of white persicaria with the production of branches from the upper axillary buds. These flowered and set abundant seed. This behaviour probably accounts for the persistence of this weed in arable rotations. The greater competitive ability of barley may be attributed to its larger embryo, giving much larger plants at emergence. The intrinsic relative growth rate of white persicaria is as high as, or higher than, that of barley and falls more slowly with time. This advantage is not sufficient to offset the initial differences in size while barley is vegetative. The larger embryo of barley also determines the more intense competition that exists between plants of this species than between plants of white persicaria at similar densities and times from germination. With equal weights of produce per pot (or unit area) the intensity of competition within each species appears to be similar. It is emphasized that the course of growth with time, rather than weight-density relationships at given points of time, must be followed in order to understand the influence of density. Two functions of the relative growth rate with time are examined. [See also *Fld Crop Abstr.* 12 : 64.]—M.H.

1549† PAWLIK, A. Untersuchungen über das Wachstum einiger landwirtschaftlicher Unkräuter in Wasserkulturen unter besonderer Berücksichtigung der Borwirkung. [**Growth of some agricultural weeds in water culture with special reference to the action of boron.**] *Thesis, Landw. Hochsch. Hohenheim* 1957, pp. 64, bibl. 50, illus. [Inst. PflSchutz, Landw. Hochsch. Hohenheim Stuttgart, W. Germany]

1550 MINISTRY OF AGRICULTURE, NORTHERN IRELAND. **Control of weeds on arable land.** *Mon. Rep. Minist. Agric. N. Ire.* 1959, **33**, No. 12, 362–8.

Notes are given on cultural and chemical methods for weed control, particularly in cereals, kale and fibre flax.—A.M.H.

1551† STRYCKERS, J. La destruction de plantes adventices au moyen de produits chimiques. [**The destruction of weeds by chemicals.**] 4th edn, [n.d.], pp. 63, bibl. 40, illus., 2 charts. Brussels : Minist. Agric. [Received Feb., 1959]

In this revised edition [for the previous one see *Fld Crop Abstr.* 8 : 276], indexes of crops, weeds (scientific and French names) and herbicides are included.—E.B.O.

1552† VERMA, R. D. and others. **Progress of chemical weed control in India.** *Indian J. Agron.* 1958, **2**, No. 4, 243–53, bibl. 71. [Indian Agric. Res. Inst., New Delhi]

This is a literature review of investigations, chiefly in India, on the control of weeds by cultural, biological and chemical methods. The review is devoted more especially to the chemical control of some important weed species (*Saccharum spontaneum*, *Cynodon dactylon*, *Cyperus rotundus*, *Sorghum halepense*, *Pluchea lanceolata*, *Xanthium strumarium*, *Carthamus oxyacantha* and *Eichhornia crassipes*), weed control in certain crops (including rice, wheat, cotton and potato), and to soil treatment.—D.B.

1553 DEPARTMENT OF AGRICULTURE, TASMANIA. **Recommendations for chemical weed control.** *Tasm. J. Agric.* 1958, **29**, No. 4, 314–17.

Suitable herbicides for weed control in cereals, peas and potatoes and for the control of certain weeds, together with the recommended dosages and times of application, are tabulated.—A.M.H.

1554† KIRINDE, S. T. W. **Weed control in dry land farming.** *Trop. Agriculturist* 1957, **113**, No. 2, 131–46, bibl. 21, illus. [Dry Zone Res. Sta., Maha Illuppallama, Ceylon]

Although tillage for weed control causes soil erosion in Ceylon, 2 mechanized weedings (the first within 10 days from sowing) are considered necessary, until a suitable chemical method of weed control has been found. Weed species present are named. Cover crops and mulches protected the soil against erosion, but did not control weeds.—E.B.O.

1555† MUZIK, T. J. and LAWRENCE, J. M. **Separation of specific and non-specific effects of chemicals on plants.** *Nature, Lond.* 1959, **183**, No. 4659, 482, bibl. 4. [Washington State Coll., Pullman]

In a test using the technique described by Loustalot and others (*Science* 1953, 118, p. 627), the author shows that spraying the foliage of bean plants (*Phaseolus vulgaris*) with 1, 2 and 4 lb. a.e. of 2,4-D (amine salt in water solution) per ac. lowered the protein and amino-acids in the roots

(the lowering being superficially correlated with increase in amount of the acid applied). Similar changes in the content of the proteins and amino-acids also occurred in the untreated controls which were uprooted and left to die and it appears, therefore, that they occurred as a result of damage or death and not directly as a result of 2,4-D treatment *per se*.—M.H.

1556† Repp, G. Zur Selektivwirkung von 2,4-D. Die Abhängigkeit der Wuchsstoffempfindlichkeit vom Bau der äusseren Hautschichten. [**The selective action of 2,4-D. The dependence of sensitivity to growth substances on the structure of the outer layer.**] *Z. Acker- u. PflBau* 1958, 107, No. 1, 49–66, bibl. 18, illus., English summary.

The epidermis and cuticle were studied in plants known to be resistant to 2,4-D in order to investigate the possibility of forecasting resistance to growth substances. The structure of the outer wall of the epidermis was not important in this connexion, but the cuticle was. Dicotyledons and Gramineae which were resistant to 2,4-D usually had a thick cuticle on the upper surface of their leaves. Grasses which have leaves which roll in dry weather (*Lolium perenne* and *Agropyron repens*) had the thick cuticle on the under surface of the leaves, thus affording protection during dry weather, which is also normally chosen for spraying. Resistance to 2,4-D was not related to the development of the cuticle on the stalk. In annual species, there was no difference in the cuticular development of young and older parts of a plant, but there was a greater sensitivity of the former to 2,4-D ; this difference in sensitivity must have been of a physiological nature. There is a brief discussion of the literature on the significance of the outer layer as an absorbing organ. F. Ger. s.—D.B.

1557† Verdejo, V. G. El 2,4-D, el acido 2,4-diclorofenoxiacetico. [**2,4-D, 2,4,-dichlorophenoxyacetic acid.**] *Arch. Inst. Aclim.* 1958, **7**, 9–65, bibl. 66.

This review on 2,4-D is primarily concerned with its physiological effects on plants, particularly weeds. Lists are given of weed species showing their susceptibility to 2,4-D.—E.B.O.

1558† Stubbs, J. **A new herbicide.** *Outlook on Agric.* 1958, **2**, No. 2, 64–8, bibl. 2, illus. [ICI, Ltd., Jealott's Hill Res. Sta., Bracknell, Berks]

Some properties of 1 : $1^1$-ethylene-2 : $2^1$-dipyridylium dibromide are described. It is a very potent, rapid-acting, translocatable, non-persistent, post-emergence herbicide. Although it is readily soluble in water, its rapid entry into stems and foliage renders it unaffected by rain falling soon after application. It is likely to be mainly of use for potato-haulm destruction, crop desiccation and general weedkilling. F. s.—A.M.H.

1559 Hurtt, W. **The effect of various factors on the movement of CIPC in certain soils.** *Weeds* 1958, **6**, No. 4, 425–31, bibl. 12. [Maryland Agric. Exp. Sta., College Park]

1560 Sheets, T. J. **The comparative toxicities of four phenylurea herbicides in several soil types.** *Weeds* 1958, **6**, No. 4, 413–24, bibl. 19. [California Agric. Exp. Sta., Davis]

The results are given of trials with fenuron, monuron, diuron and DCU with 17 soil types under glasshouse conditions. F. s.—P.J.B.

1561 Gantz, R. L. **A study of the herbicidal effectiveness of alpha-chloro-N,N-diallylacetamide when incorporated into the soil.** *Diss. Abstr.* 1958, **19**, No. 5, 927. [Univ. Illinois, Urbana]

In 2 years' field trials in Illinois, pre-emergence applications of 2 or 4 lb. CDAA/ac., to the surface of undisturbed soil, gave slightly better control of grass weeds than did similar treatments incorporated into the surface soil. No injury to maize was noted. Applications of 4 lb. CDAA/ac. to the soil surface allowed some establishment of millet [sp. not given] in the absence of rain after treatment, while under these conditions, incorporating CDAA into the surface soil completely killed millet. There was evidence that CDAA would not remain active in the soil for longer than 4 weeks under conditions favourable to crop growth ; incorporating CDAA into the soil had no effect on its persistence in these trials.—P.J.B.

1562 Davis, D. E. and Funderburk, H. H. **Variability in susceptibility to injury by DNBP.** *Weeds* 1958, **6**, No. 4, 454–60, bibl. 3. [Alabama Agric. Exp. Sta., Auburn]

In laboratory trials, plants of a number of crops were exposed to dinoseb as a pre-emergence treatment at different rates of application, or to dinoseb vapour, in an attempt to determine whether differences in crop reaction were related to differences in morphology and physiology. The crops most susceptible to damage were cotton, oats and soyabeans, followed by grain sorghum, then peas and maize, the last 2 of which were approximately equal in resistance, and finally groundnuts, which were very resistant. With the exception of grain sorghum, resistance to dinoseb was positively correlated with seed size, particularly within the group of broad-leaved crops. The relative susceptibility of the crops was unaffected by the method of applying dinoseb. There was no evidence that plants produced any substances that exerted an antagonistic effect on dinoseb.—P.J.B.

1563† Day, B. E. **A simplified logarithmic plot sprayer.** *Weeds* 1958, **6**, No. 4, 441–6, bibl. 1, illus. [Univ. California Citrus Exp. Sta., Riverside]

The apparatus described is identical in prin-

ciple with that of the Chesterford logarithmic sprayer. [See *Fld Crop Abstr.* 9: 246.] The design is simplified by combining pump, concentrate container and agitator in one unit, thus enabling it to be carried by hand and to be independent of external sources of power.—P.J.B.

# SURVEYS AND LAND USE

## SURVEYS

1564 Nowosad, F. S. **Farming in the sub-Arctic.** *Agric. Inst. Rev.* 1959, **14**, No. 1, 11–14, 53, illus. [Canada Dep. Agric., Ottawa, Ontario]

In the Yukon, Olli barley yields 25–45 bu./ac. Yields of feed oats as high as 60 bu./ac. have been obtained from the varieties Larain, Exeter and Abegweit grown in large fields. Spring wheat does not ripen fully every year, though feed grades can be produced ; Saunders yielded 26 bu./ac. in 1958. Potatoes have been a successful crop. At Fort Simpson, N.W. Territories, spring wheats such as Thatcher and Saunders frequently yield 40 bu./ac. Beaver and Victory oats, and Newal and Olli barley, give successful crops. In the Ungava Bay region, Olli barley matured when given 100 lb. ammonium phosphate/ac., whereas unmanured barley scarcely headed.—R.B.

1565† Lommez, J. Aperçu de l'agriculture belge en 1957. [**Outline of Belgian agriculture in 1957.**] *Rev. Agric., Brux.* 1958, **11**, No. 5, 701–42. [Serv. Econ., Minist. Agric., Belgium]

1566† Bureau pour le Développement de la Production Agricole Outre-Mer. L'Ankaizina. (Études générales et perspectives de mise en valeur). [**Ankaizina (Madagascar). General studies and prospects of improvement.**] [n.d.], pp. 413, illus., Paris : Bur. Dev. Prod. Agric. Outre-Mer.

This study of the Ankaizina region of Madagascar is concerned with the following aspects, amongst others : climate, vegetation, pastoral and agricultural activities. An attempt is made to draw up a programme for improving this region.—E.B.O.

1567† Troupin, G. Les cartes du couvert végétal africain. [**The vegetation maps of Africa.**] *Folia sci. Afr. cent.* 1958, **4**, No. 2, 27–31, bibl. 11.

Information is given on vegetation maps of Africa, completed or projected. Among the latter is a botanical atlas, to be prepared under the auspices of C.C.T.A./C.S.A., which will include : (a) a vegetation map on a scale of 1/5,000,000 ; (b) homoecoclimatical maps for indicating the areas where certain crops, or agricultural or pastoral activities, could be extended ; (c) distribution maps of phenomena resulting from interactions between environment and vegetation ; (d) distribution maps of useful species in relation to environmental factors. [See also Abs. 1075.]—E.B.O.

1568† Beatty, G. F. **Land, water, and agriculture in village communities of the Upper Damodar Valley, India.** *Diss. Abstr.* 1958, **19**, No. 5, 1051. [Univ. Illinois, Urbana]

## LAND USE

1569† Stamp, L. D. **Land utilization in the Commonwealth.** *J. roy. Soc. Arts* 1959 **107**, No. 5031, 199–211, bibl. 19.

1570 Lebon, J. H. G. **Land use mapping in Sudan.** *Econ. Geogr.* 1959, **35**, No. 1, 60–70, maps 2. [Univ. Khartoum]

1571 Van Wambeke, A. Carte des sols et de la végétation du Congo belge et du Ruanda-Urundi. Notice explicative. 12. Région de Bengamisa. [**Map of the soils and vegetation of the Belgian Congo and Ruanda-Urundi. Explanatory note. 12. Bengamisa region.**] *Publ. I.N.É.A.C.* 1958, pp. 47, bibl. 8, 2 maps.

Information is given on the environment, soils and land use of an area of 90,000 ha. which was studied in order to establish peasant holdings and to develop the extensive growing of food crops. There are maps of soils and land utilization (scale 1/100,000).—E.B.O.

1572† Landgraf, E. and Pommer, J. Auswertung der Nutzflächenveränderungen 1949–1956 im Regierungsbezirk Niederbayern für die Beratungsarbeit. [**An assessment, for the purposes of advisory work, of changes in crop areas in Lower Bavaria during 1949–56.**] *Bayer. landw. Jahrb.* 1958, **35**, No. 6, 643–70, bibl. 18.

1573† Baron-Hay, G. K. **Factors influencing post-war land development in Western Australia.** *J. Aust. Inst. agric. Sci.* 1958, **24**, No. 4, 303–8, bibl. 3. [Land Settlement Board, W. Aust.]

1574 Hsieh, S. C. and Lee, T. H. **An analytical review of agricultural develop-**

**ment in Taiwan. An input-output and productivity approach.** [Chinese] *J. agric. Assoc. China* 1958, No. 24, 32–42, English summary.

## LAND RECLAMATION

1575 Bellis, E. **Annual report for irrigation investigations, 1957.** *Rep. Dep. Agric. Kenya 1957 Vol. 2*, Nairobi, 1959, 110–15.

In a trial at Hola, yields of several irrigated crops grown on saline, alkaline soils of the desert hinterland, without prior reclamation, were very variable because of pest-, disease- and vermin-damage. Sowing in April, at the start of the rainy season, gave the best yields. The effects of growing crops on ridges, low raised beds and cambered beds, combined with gypsum and leaching treatments, were investigated. With maize, bulrush millet, rice, cowpeas and groundnuts, but not cotton, cultivation on ridges and beds resulted in higher yields than cultivation on the flat. Applying gypsum, or leaching on the flat, had little effect on yields. Leaching of raised beds was distinctly harmful, probably because of depletion of soil N. —A.M.H.

1576† Guillaume, A. Économie rurale de l'Océanie française. Esquisse de développement agricole. [**Rural economy in French Oceania. An outline of agricultural development.**] *Agron. trop., Nogent* 1958, **13**, No. 5, 558–629, English and Spanish summaries.

Among aspects considered are : the development of rice-growing (this is insignificant at present) and land reclamation. [See also Abs. 952.]—E.B.O.

1577† Gorrie, R. M. **Land reclamation in the Old and New Punjabs.** *World Crops* 1959, **11**, No. 5, 163–6, illus.

The extent of the erosion problem on unirrigated land in the Punjab is indicated and the reclamation work undertaken in the area by both India and Pakistan is described.—A.M.H.

1578 Rasulev, A. [**The rehabilitation of solončak areas in Central Fergana (Uzbek SSR).**] [Russian] *Hlopkovodstvo (Cott. Prod.)* 1958, **8**, No. 9, 43–9.

In the Fergana region the soils in the valleys just above flood level consist of a surface salt pan, under which is a porous layer over a thinner salt pan. Such soils, with a high salt content, require 10–15 thousand cu.m. flood water/ha. to make them suitable for cotton crops. They are improved by first growing a rice crop which requires 30–40 thousand cu.m. irrigation water/ha. The desalting effect of the rice crop is greater than that of winter flooding. Other experiments described include the exploitation of solončak areas by sowing cotton after flooding, and by sowing lucerne.—H.B.

# FARMING SYSTEMS AND PRACTICES

1579† Watson, K. A. **Agronomy section. Experiments report. Fallows.** *Rep. Dep. Agric. N. Nigeria Pt 2 1956-7*, [n.d.], 79–81. [Received Feb., 1959]

Woody shrubs (*Lophira alata* and *Afzelia africana*) were less efficient as a fallow cover and fertility builder than gamba (*Andropogon gayanus*). Yields of millet and guinea corn in the 2nd year after fallow, benniseed (*Sesamum indicum*) in the 3rd year and yams in the 4th year were all significantly less after shrub than after gamba fallow. —A.M.H.

1580† Cabral, A. L. Feux de brousse et jachères dans le cycle cultural arachide-mils. [**Bush fires and fallows in the crop cycle groundnuts/millet.**] *Bol. cult. Guiné portug.* 1958, **13**, No. 51, 257–68, illus., English summary.

This is a French version of the paper abstracted in *Fld Crop Abstr.* 9 : 578. [See also *Fld Crop Abstr.* 9 : 825.]—E.B.O.

1581† Günzel, G. Ertragsverhältnisse vor und nach Wiesenumbruch. [**Comparison of yields before and after ploughing meadowland.**] *Bayer. landw. Jahrb.* 1958, **35**, No. 5, 515–29, illus. [Lehr- u. Forschungsgut Roggenstein der Techn. Hochsch. München-Weihenstephan, W. Germany]

When grassland was ploughed for arable cropping, the increase in production, calculated in S.E., ranged during 1947–56 between 36% on a clay soil and 198% on a mineral/peat soil, the average being 78%. Net profit increased 6–8 times. F. S.—D.B.

1582† Simon, W. and Eich, D. Über den Einfluss von Weisskleegrasuntersaaten unter Weizen auf die Ertragsleistung der ersten Nachfrucht Fütterrüben und der zweiten Nachfrucht Sommergerste. [**The effect of a white-clover/grass mixture undersown in wheat, on the yield of fodder-beet as the first following crop and spring barley as the second following crop.**] *Dtsch. Landw.* 1959, **10**, No. 1, 18–20. [Inst. Acker- u. PflBau Müncheberg (Mark) der Deutsch. Akad. LandwWiss. zu Berlin]

In moist situations, a mixture of white clover

and meadow fescue sown under wheat improved yields of fodder-beet as the first following crop and spring barley as the second following crop. In moderately moist situations, white clover alone as the undersown crop had a beneficial effect on the following crops, but the improvement was not so marked as in moist situations. In dry situations, on the other hand, yields of sugar-beet (as following crop) were lower after white clover undersown in wheat than after the cereal alone. The undersown crop had no effect on the yield of the nurse crop. F. Ger. s.—D.B.

1583 Brown, P. **The results of some short term rotation experiments in Nyasaland.** *Rhod agric. J.* 1958, **55**, No. 6, 626–33, bibl. 3. [Agric. Res. Sta., Lilongwe]

Maize and groundnuts, but not cotton, yielded better in rotation than when grown for a second successive year on the same land. Green manures (velvet beans or sunnhemp) gave the largest crop increases, but had the disadvantages of occupying the land unproductively for a whole year and requiring considerable labour for turning-in. F. s.—A.M.H.

1584 Spencer, F. M. and Russell, I. **Intercropping.** *Rep. Dep. Agric. Tanganyika 1957 Pt 2* Dar-es-Salaam, 1958, 7–8 and 55–6. [Regional Res. Sta., Ilonga and Mwanhala Res. Sta.]

At Ilonga, maize yields were significantly, but not seriously, reduced by the presence of interplanted groundnuts (20,000–40,000 groundnut plants/ac.). Groundnut yields per ac. of intercropped groundnuts and maize (4000–12,000 maize plants/ac.) were considerably lower than those from groundnuts in a pure stand. Maize yield was significantly less at lower maize populations, but groundnut population had no significant effect on groundnut yield. All the combinations of maize and groundnut populations tested gave a higher economic return per ac. than either crop in a pure stand. At Mwanhala, groundnuts were interplanted with maize or sorghum at all combinations of high, medium and low populations of each crop. At the low maize population (3700 plants/ac.), there was a clear superiority in yield of both maize and groundnuts on the intercropped plots at all groundnut populations in the range 22,400–44,800 plants/ac. At the medium maize population (7500 plants/ac.), intercropping greatly increased maize yields at the low groundnut population and decreased yields slightly at the high groundnut population. There were also slight, but not significant, losses in groundnut yields. At the high maize population (11,200 plants/ac.), there was a general reduction in yield of both crops, except for maize grown with a low population of groundnuts. Intercropping groundnuts and sorghum was greatly superior to growing pure stands, except that the low population of sorghum (11,200 plants/ac.) yielded less with a medium population of groundnuts than in a pure stand.—A.M.H.

1585 Bumpus, E. D. **Molo Grassland Research Station. Effect of legumes.** *Rep. Grassl. Res. Sta., Kitale, 1958 Pt 2*, [n.d.], 16–17.

Subterranean clover, used as a green manure crop, sown in Aug. and rotavated-in during the following June, increased the green-matter yield of the succeeding wheat crop from 5 to 10 tons/ac.—A.M.H.

1586 Hellings, A. J. Resultaten van beregeningsproeven in Noord-Limburg. [**Results of irrigation trials in North Limburg, Netherlands.**] *Meded. Inst. Cultuurtech. Waterhuis., Wageningen* 1958, No. 5, pp. 12, bibl. 4.

The results are given of trials at different locations in the province of Limburg in 1955, a very dry year, and 1956, a very wet year. In 1955, sprinkler irrigation resulted in variable yield increases of wheat, oats and rye, mainly because of damp conditions in spring. With potatoes, irrigation increased yields and, at one location, almost doubled them, but its effect tended to vary according to the susceptibility of the varieties to blight [*Phytophthora infestans*]. Irrigation markedly increased the incidence of blight in Bintje, but not in Ijsselster. With fodder-beet, root-yields were increased by about 30 hkg./ha. at each of 3 locations. In 1956, no crop, except barley, showed any yield increase as a result of irrigation and with barley, the yield increase was only slight.—P.J.B.

1587† Brouwer, W. Der Einfluss der Beregnung auf Boden und Pflanze. [**The effect of sprinkler irrigation on soil and plant.**] *Wissensch. Z. Univ. Jena, Math. Wiss. R.* 1957/8, **7**, No. 2/3, 231–4, bibl. 10. [Inst. Acker- u. PflBau, Landw. Hochsch. Hohenheim Stuttgart/Hohenheim, W. Germany]

The paper discusses : (1) the effect of rain drops on soil ; (2) the lowering of soil temperature as a result of evaporation ; (3) the methods used for determining the time of sprinkling ; (4) the ways in which sprinkler irrigation increases yields ; and (5) the quantities of water which have proved satisfactory. These are : for young plants in cool weather in spring, 15 mm. ; during growth period, 20–25 mm. ; root crops during hot, dry months, 30–40 mm. ; and grassland during the same period, 50–70 mm. The importance of the economic aspect of sprinkler irrigation is emphasized. —D.B.

1588† Jolly, A. J. **Mixed farming in the tropics.** *Turrialba* 1958, **8**, No. 2, 52–4. Spanish summary. [Imp. Coll. Trop. Agric., Trinidad]

A fundamental difference between temperate

and tropical farming is the emphasis on specialization in the tropics, where, although there are many small peasant holdings which produce a variety of food crops, they are usually of the subsistence type and do not practice true mixed farming. It is thought that there are two arguments for the development of mixed farming in parts of the tropics : (a) many natural conditions appear to favour it ; (b) there is a limit to the market for export products.—E.B.O.

1589† Lorch, J. **Analysis of windbreak effects.** *Bull. Res. Coun. Israel D. Bot.* 1958, **6D**, No. 4, 211–20, bibl. 35. [Bot. Dep., Hebrew Univ. of Jerusalem]

A review article.—M.H.

# SOIL AND WATER CONSERVATION

1590† Parker, F. W. **The role of soil conservation and fertility in crop production.** *J. Soil Wat. Conserv. India* 1958, **6**, No. 3, 117–21.

This is a general review dealing with the present situation and the yield increases which are possible by the adoption of soil- and water-conservation practices.—D.B.

1591† Nair, P. D. **Soil conservation and agronomic practices in Kerala [India].** *J. Soil Wat. Conserv. India* 1958, **6**, No. 2, 67–9.

A brief account is given of the topography, climate, crops, and system of land tenure in this densely populated and severely eroded State. Remedial measures are outlined.—D.B.

1592† Wikramanayake, V. E. A. **Some aspects in the planning and assessment of soil and water conservation measures [in Ceylon].** *Trop. Agriculturist* 1957, **113**, No. 2, 157–62. [Fac. Agric., Univ. Ceylon]

1593† Davitaja, F. F. **[Scientific principles of drought control in various natural zones of the USSR.]** [Russian] *Izv. Akad. Nauk, SSSR (Bull. Acad. Sci., USSR) Geogr. Ser.* 1959, No. 1, 7–28, bibl. 8, maps.

It has been claimed that when the rivers of Siberia are diverted through Central Asia and Kazahstan, the problem of crop production and drought in these areas will be solved. While this may be true in regard to vegetables and viticulture, the production of grain crops is determined not by the presence of irrigation water but by the high cost of procuring it for the fields and the subsequent maintenance of soil fertility. The author discusses drought in relation to measures for its control which include the use of fallow crops, shelter-belts, snow retention and conservation of thawed ice and snow. In the dry zone of the S.E. European SSR and Kazah, a clean fallow is preferable to a spring crop for preceding a winter crop, as more moisture is thereby conserved.—M.H.

1594† Behr, A. B. P. G. and Thomas, M. **Contour bunding.** *World Crops* 1959, **11**, No. 5, 167–9, illus.

The use of tractor-powered implements to construct contour bunds on slopes of 2–12% in the Coimbatore region of Madras State is described. Contours at vertical intervals of 4 ft., or horizontal intervals of 250 ft., whichever is less, are marked out. The ground is subsoiled and ploughed on either side of the contour. A 15-in. bund is then built and consolidated, and later raised to 18 in. if necessary. The cost of constructing bunds by mechanical means was less than one-tenth of the cost of manual construction and the machine-made bunds required less maintenance.—A.M.H.

1595 Spencer, F. M. and Russell, I. **Rainfall conservation.** *Rep. Dep. Agric. Tanganyika 1957 Pt 2* Dar-es-Salaam, 1958, 6 and 54–5. [Regional Res. Sta., Ilonga and Mwanhala Res. Sta.]

A trial at Ilonga, using groundnuts, was designed to see whether it was possible to conserve rainfall by clean cultivation of land, even though sowing was delayed. Treatments were : (a) ploughed on 2 Jan. and land kept clean until sown on 4 March ; (b) ploughed and sown on 2 Jan. ; (c) ploughed on 4 Feb. and land kept clean until sown on 4 March ; (d) ploughed and sown on 4 Feb. ; (e) ploughed and sown on 4 March. Only (b) gave a reasonable yield (696lb. shelled nuts/ac.). The other treatments resulted in poor seed-bed conditions and low yields. At Mwanhala, the Feb. rainfall is generally more reliable, although lower, than that in Dec. and Jan. The possibility was tested that if rain falling in Dec. and Jan. could be conserved, a crop might get a better start under the more uniform rainfall conditions in Feb. The test crops were maize and groundnuts. For both crops, sowings in late Jan. yielded significantly less than sowings in early Dec. or early Jan. Among the late-sown treatments, yield was appreciably less when the land remained weedy up to the time of sowing than when it was kept clear of weeds during Dec. and Jan.—A.M.H.

1596 Bonnet, P. and Vidal, P. Protection contre l'érosion hydrologique assurée par diverses cultures en Guinée forestière. **[Protection against**

**erosion by water given by various crops in the forest region of French Guinea.**] *J. Agric. trop. et Bot. appl.* 1958, **5**, No. 10, 627–37, bibl. 8. [Div. Rech. Agron., Sérédou]

In a trial to study soil erosion, rice and other crops were grown on sloping land from which the natural forest had been cleared. It was concluded that : (a) there is an initial phase lasting 6–7 months during which soil losses caused by water erosion increase, followed by a stabilization phase during which losses are negligible; (b) soil losses vary with the crops ; (c) where the gradient is small, upland rice gives effective protection to the soil ; (d) even when the gradient is steep, it seems possible to grow upland rice, root crops and *Vigna catjang*[= *V. unguiculata*] which provide excellent resistance to erosion, provided they are sown on the flat and the length of the slope is reduced.—E.B.O.

1597 Mirchandani, P. M. and others. **Runoff—soil loss studies at Deochanda Experiment Station. 1. Effect of crop management practices.** *J. Soil Wat. Conserv. India* 1958, **6**, No. 3, 125–32, bibl. 2. [Deochanda Exp. Sta., Hazaribagh]

Run-off and soil-losses were determined on a 2% slope in the Damodar valley, the land being under crops of Gora upland-rice and maize, each grown (1) alone and (2) intercropped with a legume. The tabulated results show that intercropping the rice area with arhar (*Cajanus cajan*) increased run-off and soil-loss and that intercropping the maize area with arhar and urid (*Phaseolus mungo*) reduced soil-loss (but not run-off).—D.B.

1598† Morland, R. T. **Erosion survey of the Hume catchment area. 2. Vegetation.** *J. Soil Conserv. N.S.W.* 1958, **14**, No. 4, 293–326, bibl. 6, illus.

Notes are given on climate, topography, geology, soils, land use, extent of fire- and erosion-damage, nature of watercourses and catchment efficiency, for each of 5 vegetational formations in the area.—A.M.H.

1599† Robinson, E. P. **Batter stabilization on waterworks. Problems of establishing vegetation.** *Aqua, Vict.* 1958, **9**, No. 10, 203–12, illus.

The use of bitumen or perforated polythene membranes and of mulches to protect soil surfaces before establishment of vegetation is discussed. The Finn process for establishing vegetation on banks is described. The surface crust is first pulverized by dragging a "klodbuster", made of heavy chain and pointed steel rods, across the slope. An aqueous suspension of seed and fertilizer is sprayed on the prepared surface and covered with a straw-bitumen mulch. The disadvantages of introduced pasture spp. for soil stabilization purposes in Victoria are discussed. Creeping saltbush (*Atriplex semibaccatum*) is potentially useful for this purpose.—A.M.H.

1600† Harrold, L. L. and Dreibelbis, F. R. **Evaluation of agricultural hydrology by monolith lysimeters, 1944-55.** *Tech. Bull. 1179 U.S. Dep. Agric.* 1958, pp. 166, bibl. 134. [Ohio Agric. Exp. Sta., Wooster]

The lysimeter installations at the Soil and Water Conservation Research Station, Coshocton, Ohio, are described, and evapotranspiration and water-use data are given for maize, wheat, and swards of Kentucky bluegrass [*Poa pratensis*] and smooth brome grass with lucerne [see Abs. 1480].—R.B.

## AGRICULTURAL METEOROLOGY AND CLIMATOLOGY

*See also Abs. 1638.*

1601† Tunnell, G. A. **World distribution of atmospheric water vapour pressure.** *Geophys. Mem. 100 Air Minist. Met. Off.* (**9**, No. 8) 1958, pp. 61, bibl. 2, 38 maps, London : H.M.S.O., 10s.

Part 1 of this publication is an atlas of the world distribution of the daily mean atmospheric water vapour pressure for January, April, July and October. A formula is given for the variation of long-period mean daily averages of vapour pressure with height. This formula was used to reduce mean daily values to sea level. The maps, used in conjunction with the formula, can give values of vapour pressure for any position or height throughout the world. Part 2 gives a brief survey of the world distribution of diurnal variation of vapour pressure and its variation with climate. F. s.—A.M.H.

1602 Bennett, M. K. **The isoline of ninety frost-free days in Canada.** *Econ. Geogr.* 1959, **35**, No. 1, 41–50, maps 8. [Food Res. Inst., Stanford Univ., Stanford, California]

Maps are given showing the isoline of 90 frost-free days (defined as days with temperatures not below 32°F.) in Canada, and of the distribution of population and farming land. North of this isoline there is little agriculture, except stock-rearing. However, in W. Saskatchewan and Alberta,

cereal-growing extends into some areas with an average of less than 75 frost-free days per yr. South of the isoline in British Columbia and in areas east of central Saskatchewan there are many areas in which no grain crops are grown. Soils and terrain may be factors influencing the nature of agriculture in these areas.—R.B.

1603† University College of Wales, Aberystwyth. **Synopsis of symposium held on March 19th, 1958, on the subject of "The growing season."** Aberystwyth, 1958, pp. 27, bibl. to individual papers, illus., 5 maps, mimeo. [Dep. Geog., Univ. Coll. Wales, Aberystwyth]

The symposium included papers on : Growing season [the possibilities of defining growing season by meteorological parameters], by W. H. Hogg ; The measurement of frost heaving of soils in the field, by R. S. Edwards ; Growing season as affected by land aspect and soil texture, by J. A. Taylor.—A.M.H.

1604† Air Ministry Meteorological Office. **Averages of rainfall for Great Britain and Northern Ireland, 1916-1950.** 1958, pp. 36, London : H.M.S.O., 4s. 6d.

## MISCELLANEOUS

1605† European Productivity Agency, OEEC. **Documentation concerning national systems of seed certification.** *Project 215 EPA/OEEC* 1959, pp. 97.

A summary is presented of the seed certification systems obtaining in 22 countries and the terminologies used in each. This information was gathered as a preliminary to introducing a Standard International Seed Certification System adopted by the Council of the OEEC on 30 May 1958.—G.L.S.

1606 Wilcox, G. E. and others. **The effect of nematode control on the growth and nutrition of certain agronomic crops.** *Agron. J.* 1959, **51**, No. 1, 17–20, bibl. 5, illus. [Louisiana Agric. Exp. Sta., Baton Rouge]

The effect of soil fumigation with various chemicals, all of which gave good control of parasitic nematodes, on root development, yield and nutrient uptake of maize, cotton, sorghum, oats and clover was investigated. Nematode control increased maize yields by 50 bu./ac. in 1955 and by 21 bu./ac. in 1956. The increase in cotton yields ranged from 135 to 700 lb. seed cotton/ac. Yields of sorghum for silage were increased by 4·6 tons/ac. Oat and clover yields were not increased. Soil fumigation had no effect on the chemical composition of maize, cotton or oats. The addition of a fertilizer nutrient to the soil increased its % content in the plant equally on fumigated and non-fumigated soils, but the actual uptake of nutrients was greater from fumigated soil, because of the greater root development.—A.M.H.

1607† Nye, I. W. B. **The distribution of shoot-fly larvae (Diptera, Acalypterae) within pasture grasses and cereals in England.** *Bull. ent. Res.* 1959, **50**, No. 1, 53–62, bibl. 8. [Commonw. Inst. Entomol.]

1608† Anderson, L. D. and Atkins, E. L., Jr. **Effects of pesticides on bees.** *Calif. Agric.* 1958, **12**, No. 12, 3–4, illus.

Tables are given of the relative toxicity to honey bees of 81 commonly-used pesticides. Such toxicity is of special importance where crops such as cotton or legumes are grown for seed.—R.B.

1609† Department of Agriculture, United States of America. **Insecticide recommendations of the Entomology Research Division for the control of insects attacking crops and livestock. 1958 season.** *Agric. Hbk 120 U.S. Dep. Agric.* 1958, pp. 110, bibl. 116.

1610† Horber, E. Schädlingsbekämpfung und Qualitätsproduktion im Feldbau. [**Pest control and crop quality.**] *Mitt. Lebensm. Hyg., Bern* 1957, **48**, No. 6, 413–34, bibl. 35. [Landw. Versuchsanst. Zürich-Oerlikon, Switzerland]

An account is given of the present situation in Switzerland regarding the effect of insecticides on the quality of herbage, arable fodder crops, cereals, potatoes, sugar- and fodder-beet, rape, and threshed peas. The situation in Switzerland is compared with that in other European countries and in the USA.—D.B.

1611† Zeumer, H. Rückstände von Pflanzenschutz- und Vorratsschutzmitteln. [**Residues of substances used in plant protection and the protection of stored products.**] *Mitt. Biol. Bundesanst. Berlin* 1958, No. 94, pp. 124.

This is a classified bibliography of about 2350 references on residues of fungicides, insecticides, acaricides, herbicides and compounds used for influencing plant growth, present on and in crops, stored food, and fodder. The references are grouped according to their effect on man, animals (chiefly cattle, pigs, poultry, rodents), plants and

soil, and according to methods used for determining these residues. The references date from 1950, but most of them cover the period 1955–7, the period of greatest activity in this field of work.—D.B.

1612† Bertels, M. A. Plantas indicadoras do caráter do solo. [**Plant indicators of soil quality (in Rio Grande do Sul, Brazil).**] *Agros, Pelotas* 1956, **9**, No. 2, 46–9, bibl. 4, [Received Oct., 1958]

1613 Nielsen, V. and Dorph-Peterson, K. Forsøg med kalk og mergel på marskjord. **Experiments with lime and marl on salt-marsh soil.** *Tiddsskr. Planteavl* 1958, **62**, No. 3, 420–52, bibl. 7, English summary.

The results are given of trials during 1924–55, in which lime or marl was applied to a range of crops grown on acid marsh soils (mostly clay) at 4 locations in Denmark. Crops used included oats, horse beans [*Vicia faba*], barley, wheat, swedes and beet. Liming increased the yields of beet and barley most. Swedes receiving no lime gave very high yields, but still gave a clear response to liming. The response of wheat to liming tended to be variable. Horse beans receiving no lime gave low yields and responded markedly to liming, especially at the heavier rates of application (20 and 40 metric tons/ha.). On the soils used, crop yields increased progressively in most cases, as rates of lime application increased up to 40 metric tons/ha. These yield increases were mainly attributable to improvements in soil structure.—P.J.B.

1614 Mei, A. Alcuni aspetti statistico-economici dell'agricoltura brasiliana. [**Some statistical-economic aspects of Brazilian agriculture.**] *Riv. Agric. subtrop.* 1958, **52**, No. 10–12, 500–14.

1615† Winzer, K. Gegenwartsfragen der Wirtschaftsberatung. [**Current problems in advisory work in agricultural economics.**] *Landw.-ang. Wiss.* 1959, No. 94, pp. 131.

An account is given of papers (together with discussions) given at the National Conference for Advisors in Agricultural Economics, held in Wangen/Allgäu in October, 1958.—D.B.

1616† Hallett, G. **An introduction to farm management analysis, with an appendix giving the financial results of a sample of Welsh farms in 1956/57.** 1959, pp. 38, bibl. in text, Department of Agricultural Economics, University College of Wales, Aberystwyth.

1617† Meinhold, K. Untersuchungen über die Verwendbarkeit einiger Betriebsvergleichsverfahren fur die Beratung. [**Applicability of some farm-comparison methods for advisory work.**] *Landw.-ang. Wiss.* 1958, No. 92, pp. 148, bibl. 23. [Landw. Hochsch. Hohenheim]

1618† Zoller, R. B. **The vertical-block budgeting system—a new farm planning technique.** *Diss. Abstr.* 1959, **19**, No. 7, 1495. [Univ. Minnesota, Minneapolis]

1619† East Africa High Commission. **Regional research programmes 1958/1959. Agriculture, animal industry, animal disease, forestry.** 1958, iii + 83, Nairobi : Government Printer, Sh. 10.

# REPORTS

1620 **Netherlands.** Nederlands Graan-Centrum. Tien-jarenplan voor Graanonderzoek. Verslag over het 4de jaar, 1957. [**Ten-year plan for grain research. Report on the fourth year, 1957.**] Wageningen, pp. 136, illus. [Received Dec., 1958]

*See Abstracts 1099, 1117, 1168, 1278, 1283, and 1286.*

1621 **Northern Nigeria.** Empire Cotton Growing Corporation. Progress reports from Experiment Stations. Season 1957–58. London, 1959, pp. 16.

*See Abstract 1431.*

1622 **Nigeria.** Ministry of Agriculture, Northern Region of Nigeria. Annual report 1956–7, Part 2, Research and Specialist Services, [n.d.], pp. 192, mimeo. [Received Feb., 1959]

*See Abstracts 1311, 1318, 1412, 1534, and 1579.*

1623 **Kenya.** Department of Agriculture. Annual report 1957. Vol. 2. Record of Investigations. Nairobi, 1959, pp. 157.

*See Abstracts 1274, 1417 and 1575.*

1624 **Kenya.** Grassland Research Team. Annual report for 1958. Pt 2. Grassland Res. Sta., Kitale, [n.d.], pp. 23, mimeo. [Received April, 1959]

*See Abstract 1585.*

1625 **Tanganyika.** Annual report of the Department of Agriculture. 1957, Pt 2. Dar-es-Salaam, 1958, pp. 85.
*See Abstracts 1171, 1584, and 1595.*

1626 **Southern Rhodesia.** Agricultural Experiment Station, Salisbury. Annual report of experiments : season 1957/58. *Rhod. agric. J.* 1958, **55**, No. 6, 603–25.
*See Abstract 1199.*

1627 **West Indies.** Empire Cotton Growing Corporation. Progress reports from Experiment Stations. Season 1957–58. London, 1959, pp. 16.
*See Abstract 1442.*

1628 **Queensland.** University of Queensland. Department of Agriculture. Wool research report, 1958. 1959, pp. 7, mimeo.
*See Abstract 1211.*

1629 **Tasmania.** Department of Agriculture. Annual report for 1957–58. Hobart, 1959, pp. 84.
*See Abstracts 1321 and 1385.*

# BOOKS

1630 Aufhammer, G. and others. **Barley varieties—EBC.** [English, French, German] *Publ. Barley Cttee Europ. Brew. Conv.* 2nd edn, 1958, pp. xvi + 159, illus., 25 × 17 cm., Amsterdam : Elsevier Publishing Co.

Some 40 barley varieties which are important in one or more European countries are described. Each year a supplement will be issued covering new varieties which have successfully completed 3 years in the Barley Committee's trials, or varieties whose acreage in one or more countries has risen to 5% or more.—A.M.H.

1631† FAO. **Tabulated information on tropical and subtropical grain legumes.** 1959, pp. xiv + 367, 28× 20 cm., Rome.

This publication was compiled from the replies to questionnaires submitted to agricultural stations, or other organizations, in tropical and subtropical countries. Information is given on : morphology and habit ; culture ; resistance to adverse factors ; uses ; yield and quality of grain and/or forage. The species considered are *Arachis hypogaea* ; *Cajanus cajan* ; *Canavalia ensiformis* and *C. gladiata* ; *Cicer arietinum* ; *Cyamopsis psoraloides* [=*C. tetragonoloba*] ; *Dolichos uniflorus* ; *Glycine max* ; *Lablab niger* ; *Lathyrus ochrus* ; *Lens esculenta* [=*L. culinaris*] ; *Leucaena glauca* ; *Lupinus albus* and *L. termis* ; *Phaseolus* spp. ; *Pisum arvense* and *P. sativum* ; *Psophocarpus tetragonolobus* ; *Stizolobium* spp. ; *Trigonella foenum-graecum* ; *Vicia faba* and *V. sativa* ; *Vigna* spp.; and *Voandzeia subterranea.* An appendix gives the geographical location of the contributing stations and countries, together with data on local temperature, precipitation and soil type. This work is in English, only, but French and Spanish equivalents of the headings are given.—E.B.O.

1632 Ernould, L. and Van Steyvoort, L. Atlas des ennemis et maladies de la betterave. [**Atlas of pests and diseases of sugar-beet.**] 1958, pp. 72, illus., 19 × 13 cm., Tirlemont, Belgium : Inst. Belge Amélior. Betterave.

This publication consists of 30 excellent coloured photographs which illustrate the damage caused to sugar-beet by pests, diseases, frost, hail, lightning, Mg- and Mn-deficiency and an excess of Mn, with notes on symptoms, damage, the agents and their control. A key for determining the cause of damage, based on symptoms present on roots and leaves of seedlings and adult plants, and an index, are also given.—E.B.O.

1633† Chambon, R. and Alofs, M. Le district agricole du Tanganika. [**Agriculture in Tanganyika.**] 1958, pp. 140, bibl. 18, illus., Bruxelles : Minist. Congo belge et Ruanda-Urundi, 60 francs.

A French summary of this work is given in *Bull. agric. Congo belge* 1958, **49**, No. 6, 1467–99.—E.B.O.

1634† Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale. **Vegetation map of Africa south of the Tropic of Cancer.** By A. Aubréville and others. Publ. with the assistance of UNESCO. 1958, Oxford Univ. Press. **Explanatory notes.** By R. W. J. Keay. 1959, pp. 24, bibl. 265, Oxford Univ. Press, 15s.

Little was known about the vegetation and soils in many regions of Africa until the end of the last century. When, in 1923, Shantz and Marbut produced their maps showing the vegetation and soils of that continent, they studied the published work but there were large gaps. It was not surprising, therefore, that some of us found many faults in these maps when we ourselves started field work in Africa. Many people have studied the vegetation and soils of different parts of Africa during the last thirty years and there has been a great need for their work to be brought together and for agree-

ment to be sought on the nomenclature of African plant associations. This vegetation map and the accompanying descriptive booklet compiled by Dr. Keay attempts to supply that need. It is a gallant attempt to achieve the impossible ; no true picture of complex vegetation can be shown on the scale of 1 : 10 million, even by using colours and numbers to denote mosaics. " The map aims at showing the vegetation as it is today, and not the presumed climax types . . . Areas of cultivation and the stages in regrowth cannot be shown at this scale." Much of Ghana and southern Nigeria is shown as moist forest, of which the booklet states that many parts have been or are being farmed—but it does not explain that much of it is now farm or bush fallow, with no forest left. The highlands of Kenya are shown as " Montane communities, with afro-alpine communities"—does this give a fair impression of densely populated native reserves and of European farms ? Does not the 35-year-old Shantz map give a better idea of the diversity of Kenya vegetation ? Much thought obviously has been given to the classification of plant communities, and the forest types have been sorted out better than by Shantz. " The adoption of the terms ' savanna' and ' steppe ' at the Yangambi Meeting [in 1956] and in the present map is a somewhat controversial point." That is true, for these terms are thus defined in The Concise Oxford Dictionary : "Savanna. Treeless plain, great tract of meadow-like land, esp. in tropical America." "Steppe. Level plain devoid of forest esp. in Russia and Siberia." What justification can there be for applying the names of open grasslands in other continents to woodland areas in Africa, especially as the distinction between the two depends on the form of grasses and other herbs, which in turn is dependent on the intensity of grazing ? What justification can there be for such terms when " All stages from woodland to grass savanna (or even grass steppe) are commonly found within a few hectares "? Elephant grass, *Pennisetum purpureum*, is cited as a savanna plant ; does that term convey a good impression of a mass of bamboo-like stems, ten or twelve feet high, lasting for years if unburnt ? No ; elephant grass, like the mountain bamboo, *Arundinaria alpina*, and the lowland bamboo, *Oxytenanthera abyssinica*, should be classified under " Thickets—certain types of dense vegetation." Over 15 years ago, when ecology was less in favour than at present, grassland workers in East Africa agreed on names for vegetation communities which used no vernacular words from Africa or other continents, but which were based on simple physiognomic terms, such as forest, woodland, grassland and thicket. It is a pity that those terms were not published* for they seem to provide a basis of classification at least as feasible as those of the A.E.T.F.A.T. conference.

But one should not complain about the ecological work which has not been published ; instead, one should be grateful for the published works, and the compilation of this vegetation map is a very important step in the recognition of ecology in Africa. It must not be regarded as a final step, but as a very useful basis for future argument at conferences and for future work in the field.—A. S. Thomas.

1635† Schilling, G. Magnesium, ein universeller Pflanzennährstoff. [**Magnesium, a universal plant nutrient.**] 1957, pp. 100, bibl. 75, illus., English, French, Russian and Spanish summaries, 21 × 15 cm., Berlin W8 [E. Germany] : Bergbau-Handel. [Univ. Jena]

This is a review of the literature, chiefly from German and USA sources, on Mg as a plant nutrient. The subject is considered especially from the standpoint of ion exchange, plant metabolism and the specific functions of Mg in the plant. Conclusions are drawn for practical agriculture.—D.B.

1636 Royal Commission on Common Land, England and Wales. **Report 1955-1958.** 1958, pp. viii + 284, bibl. in text, illus., 2 maps, London : H.M.S.O., 14s.

The Commission was appointed in December 1955 " to recommend what changes, if any, are desirable in the law relating to common land in order to promote the benefit of those holding manorial and common rights, the enjoyment of the public, or, where at present little or no use is made of such land, its use for some other desirable purpose." The report includes sections on : the problem of common land ; the area and distribution of common lands in England and Wales ; the meaning of common land ; the commoners and their rights ; the holders of manorial rights ; the safeguarding of common land ; the reclamation of derelict commons ; recommendations. The following are among the appendices : History of common land and common rights, by W. G. Hoskins ; Some legal problems, by Sir Ivor Jennings ; The geographical distribution of common land, by Prof. L. Dudley Stamp. There is a useful, and very necessary glossary of terms used, including such rarities as bote, estovers, field reeve, levancy and couchancy, lot meadow, pannage, shack land and sole vesture.—A.G.G.H.

* [Gillman, C. used physiognomic terms in his Vegetation Map of Tanyanyika Territory ; see *Geogr. Rev.* 1949, 39, No. 1, 7–37. Editor]

# NEWS AND NOTES

## Great Britain

1637† Better Kales. The possibility of applying to kale the double-cross hybrid method as used for maize has been investigated at the Plant Breeding Institute, Cambridge. The method is being used in breeding a short-stemmed variety of marrowstem kale suitable for strip-grazing and may also be useful in breeding winter-hardy marrowstem kales. *Agriculture, Lond.* 1959, **65,** No. 10.—A.M.H.

1638† World Climatology. A short, interesting account is given of the work of the Enquiries Section of the World Climatology Branch of the Meteorological Office at Harrow, Middlesex. Experience has shown that a good proportion of requests received there concern either average or extreme values of temperature, humidity and precipitation. A collection of tables containing such data has been compiled for some 2000 places throughout the world. [A selection from these has now been published. See Abs. 476.] From *Weather*, March 1959.—C.L.S.

## Italy

1639† Seed Exchange. Seeds collected in 1958, including those of many grasses and legumes, are offered in exchange by the Istituto ed Orto Botanico of Turin University.—E.B.O.

## Czechoslovakia

1640 40th Anniversary of School of Agriculture and Forestry, University of Brno. A conference was held, in May, 1959, to mark this occasion. There were paper-reading sessions and excursions covering all aspects of plant and animal husbandry. Among the papers read, the following are noted : Development of cultivation measures for large-scale production in Czechoslovakia (J. Šimon) ; The effect of synthetic waste polyamides on quantity and quality of yield of agricultural products (J. Jurčik) ; Utilization of potatoes (B. Hošpes) ; Micro-determination of boron in soil and vegetable materials (Fr. Ráb) ; Methods of investigating sterile plant cultures for studying root excretions (J. Žák) ; The relation of stimulators to the water regime of plants (J. Šebánek) ; Occurrence of field weeds in various types of soil (F. Kühn and I. Uhrecký) ; Harvesting maize for grain (J. Štefl).—D.B.

## Nepal

1641 Potato Cultivation in the Himalayas. There is a well established area of potato cultivation in northern Nepal, chiefly in the regions inhabited by Sherpas, at 2500–3000 m. a.s.l. Potatoes are grown in rotation with buckwheat (the principal cereal) and, in sheltered areas, with spring barley. Y-virus and other diseases are not a problem here. The trebling of the population in this region of Nepal during the past 100 years is attributed to the introduction of the potato, probably from Darjeeling, about 100 years ago. *Dtsch. landw. Pr.* 4 April, 1959.—D.B.

## Australia

1642 Australian Society of Plant Physiologists. Papers read at the inaugural meeting of this society, held in Adelaide in August, 1958, included : The synchronization of host plant and symbiotic development in the field pea, *Pisum arvense* L., by J. S. Pate [see Abs. 191 and 1329] ; The symbiotic synthesis of auxin by legumes and rhizobia, by N. P. Kefford and others ; The dynamics of growth in wheat seedlings, by R. F. Williams ; The role of flower inhibition in the photoperiodic and vernalization responses of peas, by D. M. Paton. Abstracts of these papers appear in *Aust. J. Sci.* 1958, **21,** No. 5.—A.M.H.

## USA

1643† A Living Insecticide. A biological pest-control agent, thuricide, which is composed of living spores of *Bacillus thuringiensis*, is the first microbial agent to be produced on a large scale for the protection of food and forage crops. It is produced by the Bioferm Corporation and marketed by the Stauffer Chemical Co. Thuricide is specific in its action on leaf-eating insects and has been successfully used against lucerne caterpillar, maize earworm, cotton leaf-perforator, cotton leaf-roller and cotton bollworm. *World Crops* 1959, **11,** No. 4, 158.—A.M.H.

## International

1644 Hybrid Maize in Europe. In 1955–7 the area under hybrid maize, and the resulting production, have doubled. According to preliminary data, in 1958 about 17% of the total maize area was sown with hybrids. This percentage, however, varied considerably in the various countries, being approximately 100 in Belgium, 93 in the Netherlands, 43 in France, 39 in Spain, 24 in Italy, 20 in Switzerland, 10 in Austria, 6 in Yugoslavia, 4 in Greece, 1 in Portugal and 0 in Germany. Many of the hybrids available are of American origin and are not adapted to a Mediterranean climate. Furthermore, in that region [flint] maize is often grown for semolina, for which purpose the present hybrids are unsuitable. In northern Europe, however, where maize is mostly grown for fodder, the hybrids have replaced the local varieties to a great extent. *FAO/58/12/9025* 1958, pp. 2.—E.B.O.

## New publication

1645† Tropical Science. The first number of this quarterly journal, which is the successor to *Colonial Plant and Animal Products* [see *Fld Crop Abstr.* 11 : 1876] appeared early in 1959. It contains special articles on various tropical products and their utilization and reports of recent investigations at the Tropical Products Institute. There is also a 23-page bibliography of the more important reports, articles, etc., contained in publications received by the Institute in the period Oct. 1956–Dec. 1957.—A.M.H.